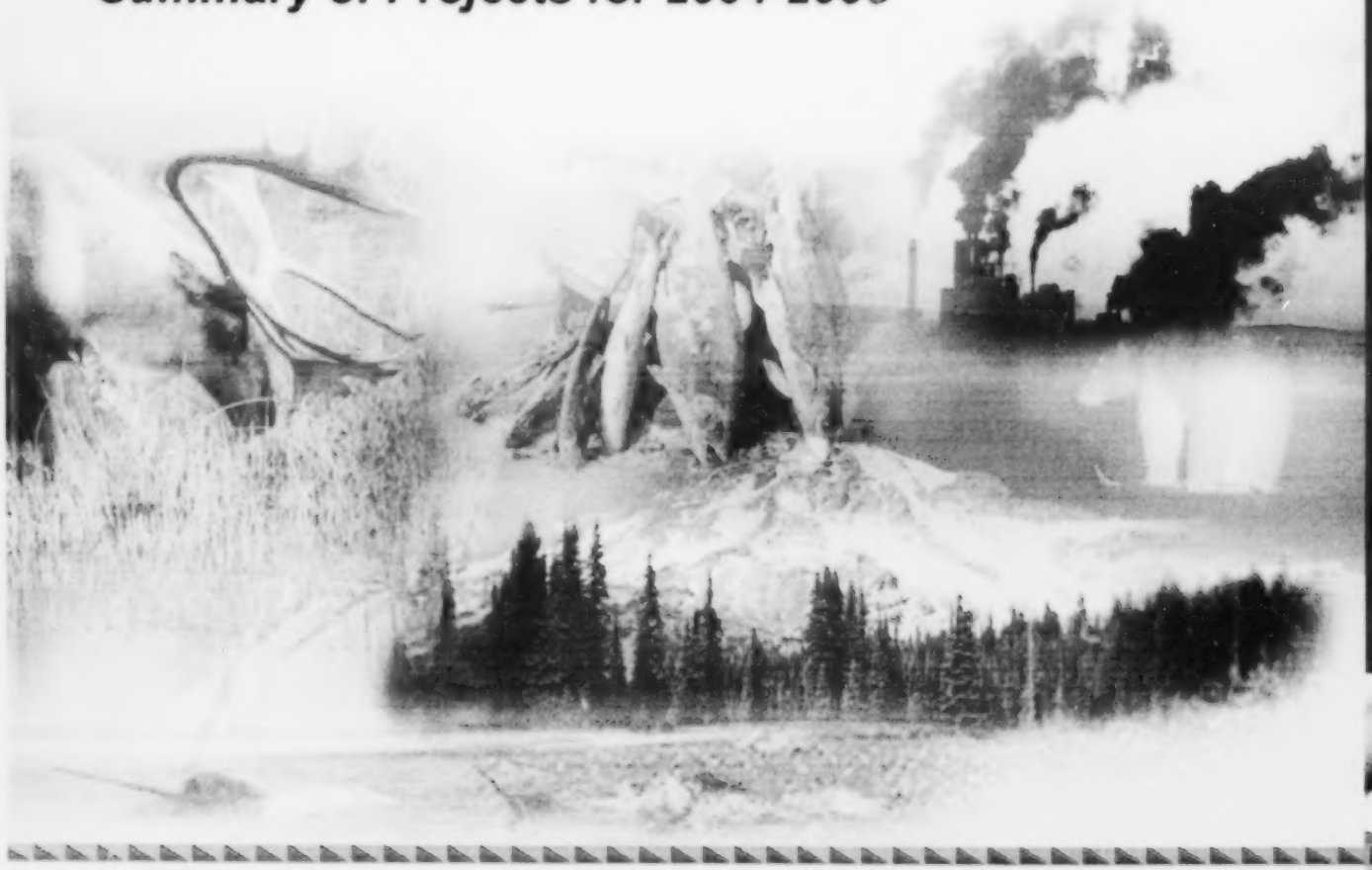
Northern Contaminants Program

Summary of Projects for 2004-2005



Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Canada

Northern Contaminants Program

Summary of Projects for 2004-2005

106-00863/

Foreword:

The Northern Contaminants Program (NCP) was established in 1991 in response to studies which showed the presence of contaminants in the Arctic ecosystem. Many of these contaminants had no Arctic sources. The three main contaminant groups of concern are persistent organic pollutants (POPs), heavy metals and radionuclides. Some of these contaminants are found at unexpectedly high levels in animals at the top of the food chain and in humans. The NCP is led by Indian and Northern Affairs Canada and brings together federal departments (Indian and Northern Affairs Canada, Health Canada, Environment Canada, and Fisheries and Oceans Canada), the three territorial governments (Yukon, Northwest Territories, and Nunavut), northern Aboriginal peoples' organizations (Council of Yukon First Nations, Dene Nation, Inuit Tapiirit Kanatami, and Inuit Circumpolar Conference - Canada) and university researchers. Together they work towards reducing and, wherever possible, eliminating contaminants in traditionally harvested foods and provide information that assists informed decision-making by individuals and communities in their food use.

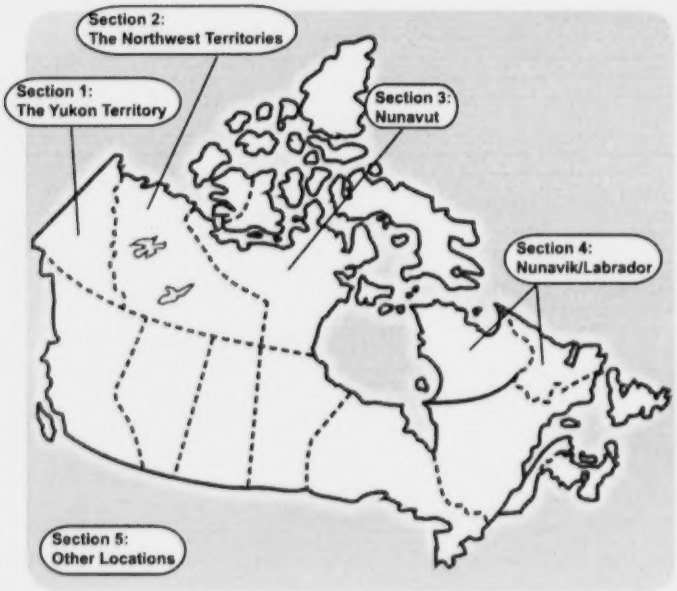
Between 1991-1996, NCP research was focussed on assessing where contaminants were found in the Arctic, at what levels, and confirming the source region. From 1998 -2003, under Phase II, the NCP shifted towards a greater emphasis on human health research, developing effective community dialogue, increasing community participation, and working towards international agreements to control the release of contaminants. Three of these agreements have now come into force. Under the current phase of the NCP, the focus is on protecting Aboriginal health and safety as a result of exposure to contaminants from consuming traditional/country foods, and on fulfilling Canada's obligations under international agreements.

The NCP funds research on northern contaminants issues . A portion of its funds is directed to communicating research results to northern communities. The education and communications part of the program is led by the representatives of the northern Aboriginal peoples' organizations.

People and organizations seeking funding for projects related to northern contaminants issues submit proposals to the NCP each year. A management committee consisting of representatives from government and northern Aboriginal peoples' organizations meet to evaluate the proposals and approve funding for projects which meet the goals of the program. Anyone conducting research in the North is required to consult with the communities that will be involved in the research and to submit completed consent forms. Project leaders are required to present their results at an annual NCP workshop, and to submit a brief description of their research results at the end of the year. Every year since 1991 these results have been published as the "Synopsis of Research Conducted Under the Northern Contaminants Program". These documents are available through the NCP. More information about the program can be found on the NCP website:
http://www.ainc-inac.gc.ca/ncp/

This electronic booklet, the "Summary of Northern Contaminants Program Projects for 2004-2005" provides a quick, non-scientific reference guide for communities and other interested groups on current-year projects being conducted by the NCP.

HOW TO USE THIS BOOKLET



To help you find the information in this booklet that is of interest to you:

- The booklet is divided into five sections based on the geographical location of where projects are or will be mainly occuring (The Yukon Territory, The Northwest Territories, Nunavut, Nunavik/Labrador and Other Locations)
- Each project summary contains the question the project is answering, relevance (why the project is occurring), summary, and location.
- There are "icons" (please see following page) located throughout the pages of the booklet to help communicate what the project is about, how you can get more information about the project, and where and when the project is occurring.
- The **bold** words within the text of the booklet are defined in the Glossary of Terms in Appendix A at the end of the booklet.
- If you wish to search for a project by affiliation or project leader, or by key subject areas and contaminant please refer to Appendix B (Affiliations and Project Leaders) and Appendix C (Key Subject Areas and Contaminants) at the end of the booklet.
- If you have more questions about any of these projects, contaminants in the North or contaminants in general, there is a list of people whom you can contact for this information in Appendix D (For More Information) at the end of the booklet.

Explanation of icons used in this booklet

PROJECT CATEGORY

Human Health Project

Monitoring Project

Communications Project

International Policy Project

WHAT THE PROJECT IS STUDYING:

Persistant Organic Pollutants (POPs)

Heavy Metal Contaminants

Radionuclide Contaminants

HG Mercury

TK Traditional Knowledge

Traditional Food

Education

Administration

QA/QC Quality Assurance/ Quality Control

Seals

Walrus

Whales

Fish

Seaducks

Seabirds

Arctic Foxes

Polar Bears

Caribou

Dall's Sheep

Marine Mammals

Moose

Mink

Wolverines

People

Children

Snow

Ice

Rain

Water

Ocean

Air

Sediments

OTHER DETAILS:

The project involves fieldwork

The project involves work taking place in a laboratory

The project involves computer models and database work

The project involves a workshop and/or a meeting

Contact information

The time frame of the project

The schedule of the project

The location of the project

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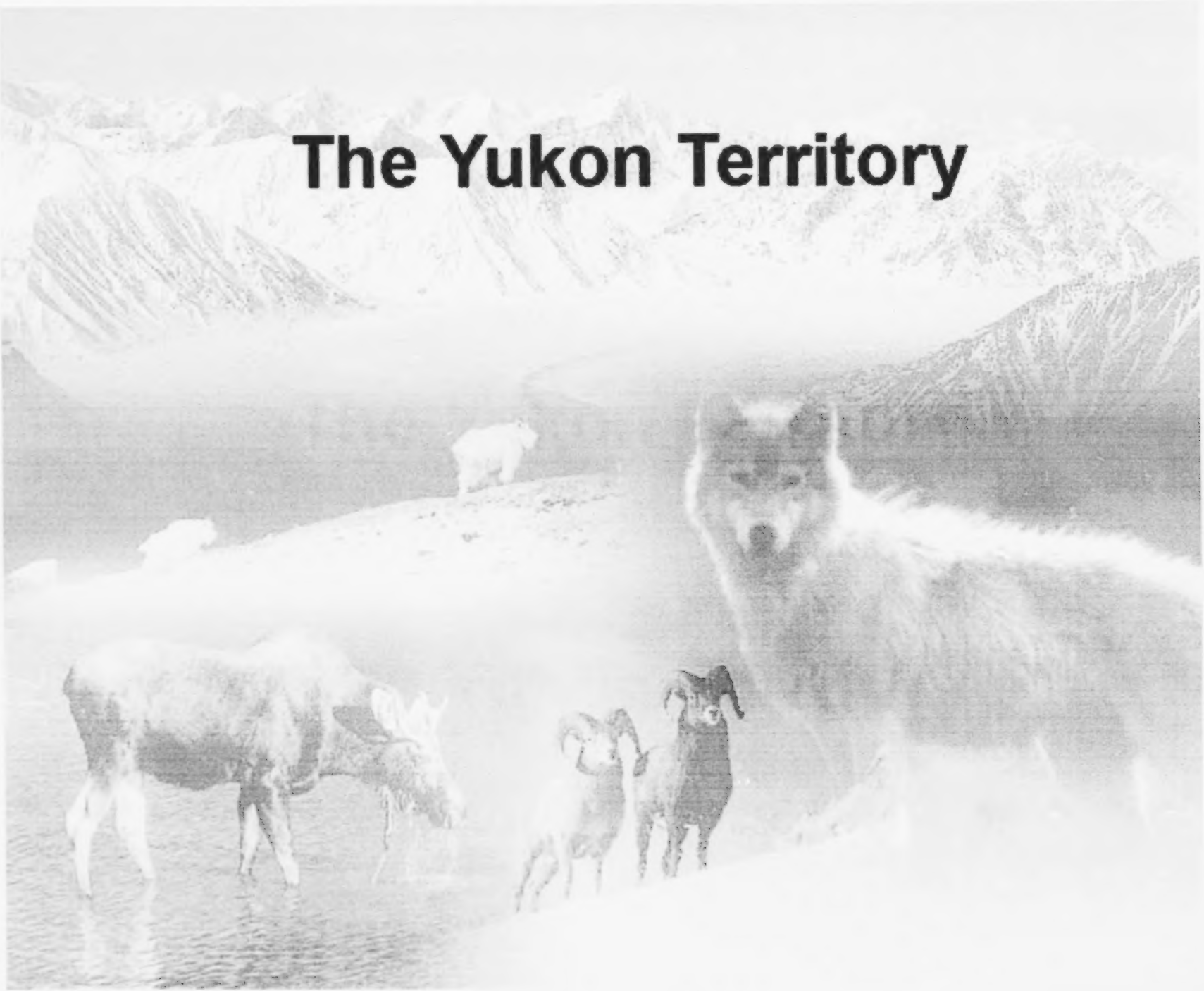

The Yukon Territory

Distribute and Communicate NCP CACAR II Results to Yukon First Nations and CYFN General Assembly

How can the Council of Yukon First Nations best provide the Yukon First Nation communities with CACAR II information?

RELEVANCE:
The current focus of the **Northern Contaminants Program (NCP)** is to address communities that are exposed to **contaminants** at levels of concern to health authorities. Despite relatively low levels of contaminants in the region, Yukon communities are still concerned about contaminants and have asked about how the disturbances to the environment affect health. Many of the answers to these questions are discussed in **Canadian Arctic Contaminants Assessment Report II (CACAR II)**. It is, therefore, the Council's role to arrange proper distribution of the information found in CACAR II to all the communities in the Yukon.

PROJECT SUMMARY:
This project will continue to distribute materials from the NCP, specifically the CACAR II results, to Yukon First Nations communities. It will also answer any questions that may arise from the distributed material. The Council will continue to participate in NCP activities.

LOCATION(S) OF WORK
Yukon

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Cindy Dickson
Manager
Northern Contaminants Program
Council of Yukon First Nations
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Whitehorse, Yukon
Y1A 3S4

Phone: (867) 393-9214
Fax: (867) 668-6577
E-mail: cdickson@cyfn.net

TIME FRAME:
April 2004 - March 2005 distribute NCP CACAR II results to Yukon First Nations and CYFN General Assembly.

Yukon Contaminants Committee Communications for 2004/2005

How well are the people of Yukon receiving information regarding contaminants?

RELEVANCE:
Since 1991, the Yukon Contaminants Committee (YCC) has worked at keeping Yukon people informed of the **Northern Contaminants Program's (NCP)** initiatives. This has been made possible through co-ordinating the communication of **contaminants** information and research in the Territory. The committee membership is diverse and consists of representatives from several federal and territorial departments, the Council of Yukon First Nations (CYFN), the Yukon Conservation Society and Yukon College. In 2003-2004 a survey was performed to evaluate how well past communication activities had passed on contaminant information to the public. The results from the survey must be evaluated in order to assess how communication activities will proceed in the future.

PROJECT SUMMARY:
This project will continue to co-ordinate contaminants studies in the Yukon, communicate the results from the research and complete the evaluation of past communication strategies. The results from the school curriculum survey will be returned to Yukon Education through the YCC. The Committee and the CYFN are also proposing to coordinate a workshop for the communities. Committee members will continue to make themselves available to communities to discuss contaminant issues and will attend community meetings and workshops as required.

LOCATION(S) OF WORK
Yukon

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Pat Roach
Chair, YCC
Indian and Northern Affairs Canada
300-300 Main Street
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Y1A 2B5

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E-mail: roachp@inac.gc.ca

TIME FRAME:
April 2004 - March 2005

Yukon Contaminants Committee Coordination for 2004/2005

What is the most effective way to communicate recent research to the people of Yukon?

RELEVANCE:
Since 1991, the Yukon **Contaminants** Committee (YCC) has been the main connection between the residents of the Yukon and the **Northern Contaminants Program (NCP)**. This committee is involved in keeping the Yukon people actively informed about the projects being undertaken through the program. The committee contains a diverse membership and is represented by several federal and territorial departments, as well as the Council of Yukon First Nations, Yukon Conservation Society and Yukon College.

PROJECT SUMMARY:
This project will help strengthen the link between the Yukon public and the research community. This task will be accomplished by communicating to the public the results of Northern Contaminants Program (NCP) work carried out in the Yukon Territory. The committee will also review proposals which involve the Yukon and aid communication between researchers and Yukon First Nations. In order to accomplish some of its goals the YCC will be required to travel to communities and attend workshops and review team meetings. It will also produce materials which will be used in the Yukon. The YCC will participate in Management Committee meetings.

LOCATION(S) OF WORK
Yukon

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Pat Roach
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TIME FRAME:
April 2004 - March 2005

Long Term Trend Monitoring of Yukon Fish from Selected Lakes

Have contaminant concentrations in Yukon fish changed in recent years?

RELEVANCE:
Fish is an important traditional/country food and makes up a large part of Yukon community members' diet. The Yukon government is very aware of this fact and has been monitoring **organochlorine** and metal **contaminants** in fish since 1993. Over the years, a temporal data set has been created along with an extensive archive of tissue samples for important subsistence fish species. This information will help generate trends for old and emerging contaminants. This project will focus on collecting samples which will allow for future evaluation of trends for currently used chemicals.

PROJECT SUMMARY:
This project will collect fish samples for future analysis of **bioaccumulating** compounds and metals. The information will be used to evaluate temporal trends for emerging contaminants and expand the temporal sample archive. Research will be conducted on the two species of fish, which comprise the largest temporal data set, lake trout and burbot. The research will take place in Lake Laberge and Kusawa Lake because they contain the most complete **temporal trends** data. The presence of **mercury** will be tested for in the liver and muscles of the fish. During analysis each fish will have their length, weight, age, gender, sexual maturity, gonodal somatic indices, liver somatic indices, abnormalities, and parasites recorded. A small section will also be achieved for the Yukon tissue archive with the results included in the Yukon contaminants database.

LOCATION(S) OF WORK

1. Laberge Lake
2. Kusawa Lake

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
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DIAND
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TIME FRAME:
April 2005 - final report due to **Northern Contaminants Program (NCP)**

A Retrospective Analysis of PBDEs and PFOS in Yukon Fish from Three Yukon Lakes

What are the levels of new contaminants in Yukon fish and how are they changing over time?

RELEVANCE:
Since 1993, the Yukon has been monitoring **organochlorine (OC)** and metal **contaminants** in traditional/country food. This collection of data has enabled the assessment of recent **temporal trends** for various **persistent organic pollutants (POPs)** and **heavy metals**. Important temporal data sets are being maintained for contaminants in burbot and lake trout, both of which are important traditional/country foods widely consumed in the Yukon. Thus, it is very important to determine contaminant levels in these fish. The primary investigators for this project contain the largest data set for Yukon lake trout and burbot samples. This information is very useful in creating an extensive and thorough set of temporal trends for different contaminants in the two fish species. The project will attempt to create a retrospective trend analysis for the currently used compounds.

PROJECT SUMMARY:
This project will develop a temporal data set of emerging contaminants for fish species of the Yukon . The two fish species chosen as representative samples are lake trout and burbot because they contain the largest data sets and time points available. The fish will be taken from Laberge Lake, Quiet Lake, and Kusawa Lake. The analysis will aid in producing temporal trends for **bioaccumulating** compounds within the fish. The compounds of interest in this project are **brominated flame retardants** (i.e. HBCDD), fluorinated organic compounds, short/medium chain **chlorinated paraffins** (SCCPs/MCCPs), and **polychlorinated naphthalenes (PCNs)**. All of these compounds will be analysed in trout muscle and liver samples.

LOCATION(S) OF WORK

1. Laberge Lake
2. Quiet Lake
3. Kusawa Lake

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Pat Roach
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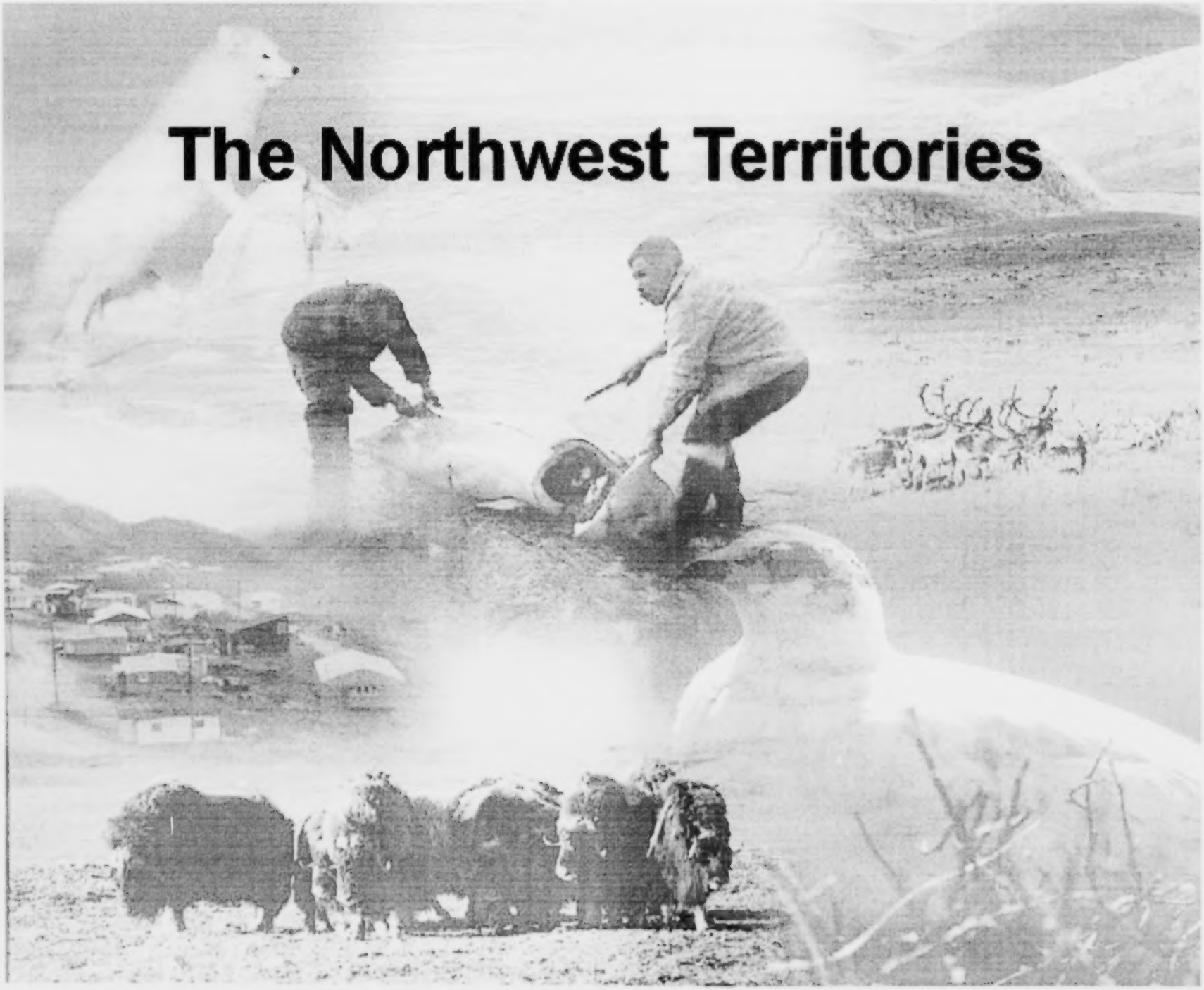
TIME FRAME:
March 2004-April 2005

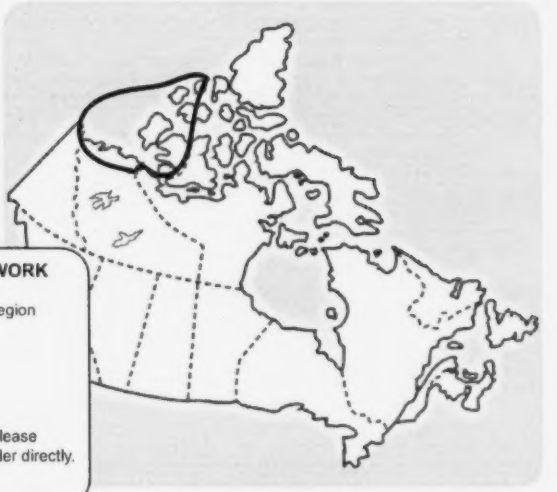
The Northwest Territories



The Northwest Territories

Gathering, Disseminating, Developing and Delivering Appropriate Education and Communication Information for the Inuvialuit Settlement Region

How can communicating contaminant information to the Inuvialuit Settlement Region be improved?



RELEVANCE:
The communities of the Inuvialuit Settlement Region (ISR) harvest marine mammals as a main part of their diet. The **Canadian Arctic Contaminants Assessment Report II (CACAR II)** contains results that show that marine mammals and people who eat them may be at risk of exposure to **contaminants**. It is important that these communities get accurate, detailed information on the benefits of traditional/country food and the contamination risks from eating these foods. In 2003-2004, Inuit comprehension, knowledge and perception of contaminants and health issues were assessed. This project will analyse the results of the survey and establish better forms of communication.

PROJECT SUMMARY:
This project will deliver and discuss the results of the Inuit population survey which will help develop a long-term communications strategy for the ISR. The main objective will be to disseminate and gather relevant information from CACAR II, the Pan-Inuit Population Study, the 2003 Inuvialuit community tour and other past activities. This information will provide ISR communities with a complete dataset, which will allow them to make informed decisions. The overall goal is to develop a long-term contaminants communication strategy and advance the day-to-day communication of the findings.

LOCATION(S) OF WORK
Inuvialuit Settlement Region

SCHEDULE
For more information please contact the project leader directly.

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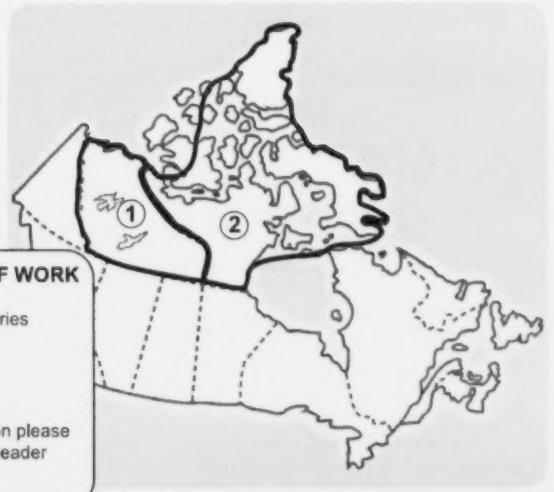
TIME FRAME:
April 2004 - March 2005

On-line Contaminant Course for NWT and Nunavut

Can an online course aid frontline health care workers in better understanding NCP results and providing the communities with answers to their questions?

RELEVANCE:
Over the years, face-to-face workshops, radio shows, and the development of educational materials have increased the level of understanding of **contaminant** issues of interest in Inuit communities. Communication problems are arising due to the complex nature of available material. This has resulted in Inuit communities lacking important information on contaminant issues directly affecting their health. The existing nutrition course is designed specifically for frontline health workers who have expressed a need for more information regarding contaminants and food safety. This project proposes to develop an online course on contaminants and food safety which will be directed at frontline health workers, enabling them to answer questions from the community.

PROJECT SUMMARY:
This project will create an online course which will develop the skills and knowledge of frontline health workers and people working in the area of renewable resources. The topics that will be covered are in the areas of contaminants in traditional/country food, contaminants and health, food safety and food choice. The objectives of this course are to enhance currently established communication efforts and to build capacity to provide community-based education. Another objective of the project will be to develop networks between frontline workers, elders and researchers.



LOCATION(S) OF WORK

1. Northwest Territories
2. Nunavut

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Eric Loring
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TIME FRAME:
2004
June - develop project steering committee
June-Sept - create the course
June-Aug - recruit people to assist with the coordination of training
Mid Aug-Mid Sept - send invitations and sign-up sheets for the online training
Aug - develop print information packages
Sept 15 - complete registration
Sept - send information packages
Oct/Nov - ITK will deliver the online course

Community Consultations in the G.S.A. 2004/2005

How can relevant information on contaminant issues be communicated to Gwich'in communities?

RELEVANCE:
Gwich'in communities require that information, essential to their understanding of **contaminants**, be continuously provided in a timely manner. In order to provide the community with the best service possible, a Community Liaison will be appointed. The Community Liaison will provide information regarding contaminants in the area which, in turn, will educate the Gwich'in community members. This will allow the community to make informed decisions regarding the harvesting and use of traditional/country foods. This project seeks to promote better dialogue between the communities, Gwich'in organizations, **Northern Contaminants Program (NCP)** representatives and NCP scientists.

PROJECT SUMMARY:
This project will continue to promote dialogue and pass information on contaminants to the appropriate groups. It also aims to increase awareness regarding long-range contaminants issues. The Gwich'in Community Liaison has several goals which involve increasing communication between Gwich'in communities and groups involved in contaminant research. In order to reach these goals, information on contaminants will be given to Gwich'in community members in a timely and accessible fashion. This year the results from **Canadian Arctic Contaminants Assessment Report II (CACAR II)** and the NWT Fact Sheets will be discussed, and regionally relevant resource materials will be develop in order to better serve Gwich'in communities. The project will also assist the communities in identifying and submitting proposals to the NCP or other program funding.

LOCATION(S) OF WORK:
Gwich'in Settlement Area

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
bi-yearly and yearly reports

Simple Language Translation of Research Results in the NCP-NWT

How can the scientists and elders be brought together to discuss contaminant issues?

RELEVANCE:
In the past, communication of scientific results from the **Northern Contaminants Program (NCP)** funded projects has been very poor within the Aboriginal communities. It has been suggested that this communication gap can be closed if the scientific community take the time to put their results into a language that these communities can understand. It is also very important for these communities to have someone to turn to if they have questions on issues of concern. It is believed that once Aboriginal communities have created an avenue of discussion with the scientific community, meaningful discussions will occur. This project is proposing to bring together the scientific community with the traditional knowledge holders of the region.

PROJECT SUMMARY:
This project will attempt to improve communication between Aboriginal communities and the scientists. In order to accomplish this task, Aboriginal issues of concern will have to be identified and then the most appropriate person from the scientific community would have to be identified in order to address these issues. Elders and scientists will also be brought together to exchange views in the hope that this might also increase communication between the two parties. If the elders come to understand the issues, community members will be able to turn to them with concerns and for guidance.

LOCATION(S) OF WORK:
Northwest Territory Metis Nation

SCHEDULE
For more information please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Chris Heron
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Northwest Territory Metis Nation
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X0E 0P0

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TIME FRAME:
bi-yearly and yearly reports

Communicating and filling the Gaps of CACAR II

What is the best method of communication that can be used to inform the Deh Cho community that their traditional food is safe to eat?

RELEVANCE:
Many people of the Deh Cho rely heavily on traditional foods and in the last five years several studies and projects have taken place that dealt with **contaminants** found in traditional/country food. The Deh Cho First Nations main concern is to communicate the contaminants concerns of **Canadian Arctic Contaminants Assessment Report II (CACAR II)** to the elders, community members, Aboriginal organizations, hunters, and scientists. Communities must understand that the levels of contaminants in their food is very low and that the benefits of eating traditional/country food outweigh the risks. This project fits the **Northern Contaminants Program (NCP)** criteria regarding public awareness, directed communications, resource materials and communications effectiveness.

PROJECT SUMMARY:
This project will require hiring a Local Contaminants Coordinator, who will be responsible for completing the work that will be outlined. The proposed work includes providing the communities with relevant information and allowing them to provide feedback on what should be a research priority. It is expected that current research taking place will fill in some of the knowledge gaps that came out in CACAR II. A continual distribution and development of plain language resource materials will be given to the Deh Cho community governments and the local schools. The Deh Cho community government will also receive aid in developing a community-based contaminants data bank.

LOCATION(S) OF WORK:
Deh Cho First Nation

SCHEDULE
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TIME FRAME:
bi-yearly and yearly reports

Participation and Understanding

Can communicating research results be improved through the use of a First Nation Contaminant communicator?

RELEVANCE:
The results of past research projects have steadily been communicated to the communities that have been involved. However, many questions remain unanswered. It has been determined that the people best equipped to answer these questions are local, community-respected people with a First Nations background. The main problem that arises is that many of these First Nations contaminant communicators do not fully understand the research reports. If a community member were to ask a question of scientific nature, the communicator would not be able to provide a reasonable answer. This project proposes to provide these communicators with a training program that will teach them to interpret the results from the study and convey the information back to the community.

PROJECT SUMMARY:
This project has two main objectives. The first objective is to increase the effectiveness of communicating the results from the **Northern Contaminants Program (NCP)** funded studies to the Akaitcho Dene First Nation. An individual will be selected to spend one month at the National Water Research Institute (NWRI) - Saskatoon, in order to complete an internship as a Contaminant Communicator. This individual will then be expected to return to the communities and provide answers on topics that were not understood by the community members. The second objective is to build on the partnerships with NWRI, NCP, and Northwest Territories Environmental Contaminants Committee (NWTECC).

LOCATION(S) OF WORK:
Akaitcho Territory Government

SCHEDULE
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TIME FRAME:
bi-yearly and yearly reports

Putting Public Service Announcements from the Second Canadian Arctic Contaminants Assessment Report into K'ahsho Gotine

How can we better communicate information in the Sahtu region?

RELEVANCE:
The Sahtu have many concerns regarding **contaminants** in traditional/country food sources, as they rely very heavily on them as part of their diet. Another concern is the impact contaminants may have on animals and the health of the people and the environment. Language barriers, remoteness, and the absence of regular community publications hinder the communication of timely information on contaminants to the Sahtu people. A Regional contaminants Co-ordinator (RCC) will assist in providing information about contaminants, ongoing research in the region and the benefits of a traditional diet in Kahsho Gotine. The RCC will increase the number of opportunities the Sahtu communities are given to obtain knowledge concerning contaminants and assist them in making informed decisions regarding their diet.

PROJECT SUMMARY:
The RCC will communicate information on contaminants to the community members in the Sahtu Settlement Area. This information will be delivered through cassettes that have been translated into Kahsho Gotine. The community's concerns about contaminants will be addressed by the RCC. The RCC will also address local information requirements on contaminants related to traditional/country foods and to the health and safety of the environment. Researchers can turn to the RCC for assistance with community consultations, the negotiation of research agreements for funded projects, and with the reporting of projects results to communities. Ongoing personal contact will be available for those wishing to express concerns regarding Sahtu contamination issues and residents will be continually consulted on all relevant contaminant issues. A major focus of communications activities this year will be the **Canadian Arctic Contaminants Assessment Report II (CACAR II).**

LOCATION(S) OF WORK:
Sahtu Dene Council

SCHEDULE
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TIME FRAME:
bi-yearly and yearly reports

Denendeh Communication and Education Strategy

How can contaminant information best be delivered to the Denendeh?

RELEVANCE:
Dene Nation is the national organization for the Dene. It is linked to the Metis through the circumpolar work of the Arctic Athabaskan Council. Both groups believe that **contaminants** research in the north is very important and should continue in order to help communities understand how and why they are affected. The **Canadian Arctic Contaminants Assessment Report II (CACAR II)** compiled all the contaminants data from projects that the **Northern Contaminants Program (NCP)** had funded during its second phase. This data demonstrated that Denendeh has very low contaminants levels in most of the traditional/country food that make up their diets. This project will develop a comprehensive communication strategy.

PROJECT SUMMARY:
This project will develop a five-year communication and education strategy for Denendeh. It will work with each of the regions in order to provide technical support and assisting with the development of the strategy to deliver communication/education materials or activities. These materials or activities will be delivered to specific groups of people; the elders, women, health practitioners and school children. In the long term, the project hopes to evaluate the NCP's communication/education efforts and determine ways in which it could be made more effective.

LOCATION(S) OF WORK:
Denendeh

SCHEDULE
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TIME FRAME:
bi-yearly and yearly reports

NWT Environmental Contaminants Committee (NWTECC)

How is the Northern Contaminants Program informed by community concerns when setting research priorities?

RELEVANCE:
In 1997 a central body was required to administer information on **contaminants** and research initiatives; thus the NWTECC was created. It is the main communicator in the territory and gives researchers and community members the ability to provide input on contaminants activities. Currently the NWTECC includes numerous federal and territorial government departments, Aboriginal organizations, and the Aurora Research Institute. The Indian and Northern Affairs Canada (INAC) Yellowknife office provides secretariat support to the NWTECC.

PROJECT SUMMARY:
The NWTECC will continue to develop and utilize the previously established communications networks. This will allow it to provide the communities with up-to-date information about the committee and contaminants news for the NWT. A resource library is one of the methods being planned to better service the communities. Identifying priorities and information gaps related to environmental contaminant research in the NWT is an important priority. To obtain input from communities, monthly meetings of the NWTECC will provide a forum for two-way transfer of contaminants information relevant to the NWT. The NWTECC will act as a central repository of environmental contaminant information and provide advice on appropriate funding sources for NWT. It will also review the NCP proposals for 2004-2005, and make suggestions on how to improve the proposed research. The NWTECC will also be represented at Management Committee meetings.

LOCATION(S) OF WORK
Northwest Territories

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Spatial and Long-term Trends in Persistent Organic Contaminants and Metals in Lake Trout and Burbot in Great Slave Lake, NT

Can a model be created to predict the transport and fate of POPs and mercury globally?

RELEVANCE:
The **Northern Contaminants Program (NCP)** has two main goals under the "environmental trends related to human health and international controls" envelope. The first goal is to obtain the necessary time trend **contaminant** data to review the success of international controls in reducing contaminant inputs to the north. This project will contribute towards this goal by measuring concentrations of **mercury (Hg)**, and **persistent organic pollutants (POPs)** such as polychlorinated biphenyls (**PCBs**), **DDT** and **toxaphene**. The second goal of the program is to provide early warning support for the assessment of new contaminants that may become a concern to human health and that could be considered for addition to international agreements. The new contaminants list includes **brominated flame retardants**, fluorinated organic compounds, and **chlorinated paraffins**. Lake trout and burbot were selected for the research because of their importance in traditional diets, and in commercial and sports fisheries. Great Slave Lake was chosen for the study because it contains an excellent historic database and represents an important commercial fishery in the NWT. Contaminant concentrations in several components of the aquatic **ecosystem** have been characterised in a number of regions of the lake.

PROJECT SUMMARY:
This project will assess **temporal trends** of contaminant concentrations in lake trout and burbot found in Great Slave Lake. Fish will be collected from the West Basin and the East Arm of the lake. These two sites have been selected for this study because of the different pathways responsible for delivery of contaminants. The West Basin receives contaminants from both the Slave River and directly from the atmosphere and water circulation is relatively active. In contrast, the East Arm receives contaminants mostly from the direct atmospheric deposition and water circulation is relatively slow. A series of analyses on the livers of burbot and lake trout from West Basin will be conducted to assess levels of new contaminants. The project will also examine regional differences in contaminant trends and, in particular, will compare results for burbot with those being gathered on the Mackenzie River at Fort Good Hope. In order to improve the study for future years the contaminants data from 1999-2004 for Great Slave Lake will undergo detailed interpretation.

LOCATION(S) OF WORK

Great Slave Lake

SCHEDULE
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TIME FRAME:
April 2005 - final report due to NCP

TK

Spatial and Long-term Trends in Persistent Organic Contaminants and Metals in Temporal Trends Studies of Heavy Metals and Halogenated Organic Contaminants including New and Emerging Persistent Compounds, in Mackenzie River Burbot, Fort Good Hope, NWT

How are levels of contaminants in burbot changing over time?

RELEVANCE:
It is believed that rising temperatures associated with global climate change may be contributing to the increasing levels of **mercury** in the Mackenzie River valley. In the outline for the **Northern Contaminants Program's (NCP)** 2004-2005 Call for Proposals it states that there is a need to assess levels of mercury and **persistent organic pollutants (POPs)** in burbot from Fort Good Hope. This data set is particularly important because of the extensive temporal record that has been accumulating over the past years of study. The results from this study will aid in determining whether **contaminant** levels in burbot are increasing or decreasing. Results from this study will also help to assess whether international controls are effective at reducing levels of contaminants in the Arctic.

PROJECT SUMMARY:
This project will focus on maintaining current data on contaminant levels in Mackenzie River burbot and assessing **temporal trends** of **bioaccumulating** substances. Burbot will be collected from the Mackenzie River at Fort Good Hope. Liver samples will be analysed for **chlorinated pesticides** and **PCBs** whereas liver and muscle will be analysed for mercury, **selenium** and **arsenic**. This year's results will be statistically compared to previous results and a suite of other biological parameters (such as size, age, etc) to assess temporal trends and the factors affecting those trends.

LOCATION(S) OF WORK

Mackenzie River at Fort Good Hope

SCHEDULE

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TIME FRAME:
March 2004-April 2005

Time Trend Studies on New and Emerging Persistent Halogenated Compounds in Marine Mammals from the Canadian Arctic

What are the levels of new contaminants in Arctic marine mammals and are levels changing over time?

RELEVANCE:
Past studies have shown that temporal changes in the emissions of chemicals into the environment are reflected in the concentration of chemical **contaminants** in animals from affected **ecosystems**. The project focus will be on investigating long-term contaminant trends. Results can be used to assess the sufficiency of international controls, thereby contributing to the fulfilment of Canada's obligation to scientifically support international conventions on **persistent organic pollutants (POPs)**. Measurements of new contaminants will provide an early warning for the assessment of human health risks and will provide valuable evidence in support of expanding international agreements to include new contaminants. The information derived from this project will also be used by the **Northern Contaminants Program (NCP)** in the development of a long-term monitoring strategy.

PROJECT SUMMARY:
This project will assess **temporal trends** of new and emerging organohalogen contaminants in marine mammals. The main focus of the analysis will be on a list of priority contaminants, including **brominated flame retardants**, **chlorinated paraffins**, and fluorinated organic compounds. The identification and monitoring of these new contaminants was identified as a priority in the **Canadian Arctic Contaminants Assessment Report (CACAR) II**. The project will focus on Beluga (from Hendrickson Island, Arviat, and Pangnirtung), narwhal (from Arctic Bay and Pond Inlet) and walrus (from Iglulik and Hall Beach), for which archived samples are available from multiple years. The analytical program will involve the analysis of 10 samples per species, per location, per collection year, where samples are available.

LOCATION(S) OF WORK
1. Hendrickson Island
2. Arctic Bay
3. Pond Inlet
4. Hall Beach
5. Arviat
6. Pangnirtung
7. Iglulik

SCHEDULE
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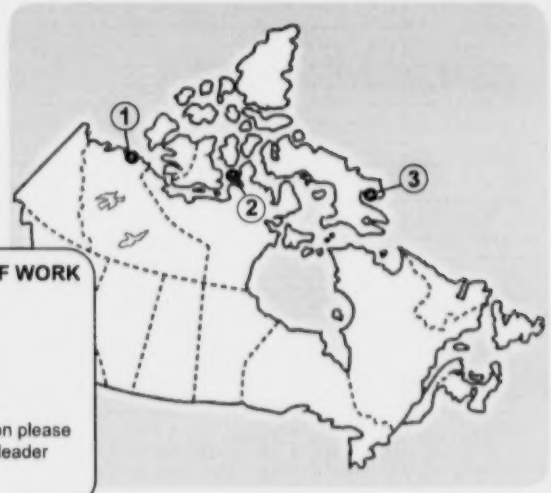
TIME FRAME:
March 2004-April 2005

Temporal Trends and Spatial Variations in Persistent Organic Pollutants and Metals in Sea Run Char from the Canadian Arctic

What are the levels of contaminants in Arctic char across the Arctic?

RELEVANCE:
Starting in 1993, research and monitoring studies determined that levels of **mercury** and **organic contaminants** were relatively high in the diets of Arctic residents. Of greatest concern are high levels of contaminants such as, **PCBs**, **toxaphene**, **DDT**, and **mercury** found in marine mammals that make up an important part of the Inuit diet. Unlike marine mammals, it has been observed that sea-run char have relatively low contaminant levels, although data is quite limited and only available for Nunavik and Labrador. Since char is also very nutritious, it is being promoted as a healthy food choice for Inuit, particularly young women. To give people confidence in the quality of Arctic char, it is important to assess current contaminant levels from numerous locations across the Arctic where char is harvested. It will also be important to initiate monitoring which will allow future assessment of **temporal trends**. This information is crucial for Canada's monitoring obligations under the **Stockholm Convention** and the Long Range Transboundary Air Pollution (LRTAP) convention.

PROJECT SUMMARY:
This project will determine changes in the concentrations of contaminants, such This project will measure the levels of contaminants in char that are returning from the ocean. The char will be collected from various locations throughout Nunavut and the levels of **persistent organic pollutants (POPs)** and metals will be determined from the samples. East-west differences between POPs and metal concentrations will be investigated and will contribute to present data sets. Other factors will be taken into consideration when the contamination levels in the fish are examined, such as age, sex, **trophic level**, and climate. Some char livers will be analysed for POPs and mercury and compared to the levels commonly found in landlocked char, seals, and beluga. In 2004 samples will be collected from Pangnirtung, Gjoa Haven, and Paulatuk.



LOCATION(S) OF WORK

1. Paulatuk
2. Gjoa Haven
3. Pangnirtung

SCHEDULE
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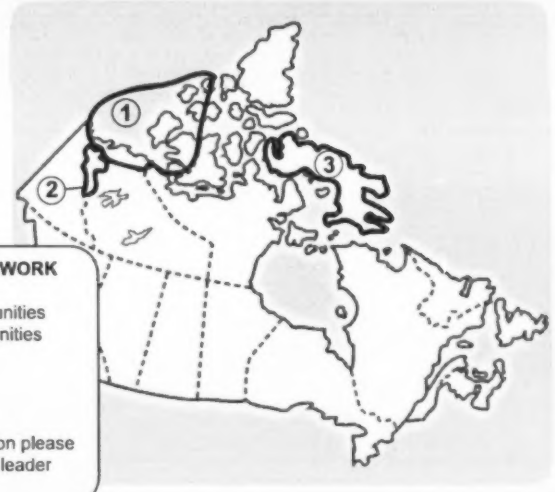
TIME FRAME:
March 2004-April 2005

Nunavut

Nunavut

Monitoring Temporal Trends of Human Environmental Contaminants in the NWT and Nunavut

What is the difference between the contaminant levels in women and infants in different regions in the North and are these changing over time?



LOCATION(S) OF WORK

1. Inuvialuit communities
2. Gwich'in communities
3. Baffin region

SCHEDULE
For more information please contact the project leader directly.

RELEVANCE:
Between 1994-1999 a territorial baseline of selected **organochlorine** and metal **contaminants** in maternal and cord blood was established for the Northwest Territories (NWT) and Nunavut. Recently, higher levels of prenatal exposure to certain contaminants have been found to be associated with subtle **neurodevelopmental** and **immunological** effects in Inuit infants from Nunavik. A three-year program is currently underway to establish **temporal trends** for selected environmental contaminants in maternal blood and hair in the Inuvik region in the NWT and the Baffin Region in Nunavut. These two regions were specifically chosen to create a contrast between a region with higher levels of contaminant exposure (Baffin) to one with moderate exposure levels (Inuvik). This project seeks to establish a relationship between contaminant exposure, traditional/country food consumption and select lifestyle factors. It will also contribute data to contaminant monitoring initiatives under international agreements such as the Global Monitoring Plan under the **Stockholm Convention**.

PROJECT SUMMARY:
This project will evaluate temporal trends of maternal exposure to selected organochlorine and metal contaminants in the NWT and Nunavut. The relationship between contaminant exposure, frequency of traditional/country food consumption, and select lifestyle factors will be examined. In order to carry out these activities, local program coordinators will be hired and trained for both regions. All the activities have been built on the feasibility work and consultations of 2003-2004. Some of the activities to be carried out this year include finalizing the dietary and lifestyle questionnaire, and developing program communication materials. Over three years it is planned that 100 maternal blood samples will be collected from pregnant women from each region. Additionally, throughout the project, preliminary information will be collected for a possible infant development study, similar to that already occurring in Nunavik, which may take place in the Baffin region starting in 2005.

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TIME FRAME:
fall 2004 - recruitment of participants will begin
March 2005 - samples will be collected

Making Results Make Sense: A Contaminants Research Handbook for Community Professionals in Nunavut

With the aid of a handbook will community professionals be better equipped to answer the communities' questions about contaminants?

RELEVANCE:
Under the **Northern Contaminants Program (NCP)**, training products were developed to help northern community professionals better understand the technical aspects of **contaminants** issues and research. A frontline training course on contaminant issues was set up and delivered to community professionals throughout Nunavut. A similar training course has not been offered since, and the course manuals were not widely produced. This has resulted in a large fraction of the community professionals not possessing the necessary training to answer community questions. This project is looking to put together a booklet that will assist community professionals in understanding the current research, and effectively communicating this information back to their home communities. It will be produced in English and Inuktitut syllabics.

PROJECT SUMMARY:
This project will develop a plain language handbook enabling Nunavut community professionals to better understand, interpret and communicate results from the research. The handbook will be specifically designed for frontline workers because they are expected to convey this information to the public. The development of the booklet will occur in five stages. The first stage will consist of defining the specific topics that will be addressed in the handbook. Stage two will consist of obtaining and reviewing relevant information from past NCP initiatives. The third stage will involve writing up the rough draft of the handbook. The fourth stage will be approving the final draft of the handbook and distributing it to all Nunavut communities. Stage five will involve a follow up on how effective the handbook is.

LOCATION(S) OF WORK

Nunavut

SCHEDULE
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TIME FRAME:
April-June 2004 - stage one: define the scope and content
June-August 2004 - stage two: collect information
August-October 2004 - stage three: develop the handbook
November 2004-April 2005 - stage four: production and distribution
February 5, 2004 - April 4, 2005 - stage five: evaluation

Niqiit Avatittinni Committee

How can people in Nunavut be better informed about contaminants research and become more involved in the NCP?

LOCATION(S) OF WORK

Nunavut

SCHEDULE

For more information please contact the project leader directly.

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TIME FRAME:

April 2004 - March 2005

RELEVANCE:

In 2003 the Niqiit Avatittinni Committee (NAC) was created from Nunavut Environmental Contaminants Committee (NECC), in response to shifting concerns and objectives contained in the **Canadian Arctic Contaminants Assessment Report II (CACAR II)**. The committee consists of professionals working in the fields of health and nutrition, environmental impacts, and research. The NAC is the link between communities in Nunavut and the **Northern Contaminants Program (NCP)** environmental **contaminants**-related research and monitoring information in Nunavut. All the information gathered by the NAC on the presence and possible health effects of contaminants in the environment is provided to Nunavummiut.

PROJECT SUMMARY:

The NAC will facilitate the process of collaborative studies, assessment and communication of information to Nunavummiut about the presence and possible health effects of contaminants in the environment. The committee's goals for this year are to: direct research in the area of contaminants and the effects on human health; review proposals for 2005-2006; provide a focus on environmental contaminants in relation to human health and nutrition; compile relevant public concerns that have not been addressed; communicate to the public the results of NCP research; help researchers translate their data into meaningful information for the public; provide a space where partnerships can be built between researchers, governments, Inuit organizations, and communities; and provide environmental expertise on issues related to environmental contaminants. The NAC will participate in Management Committee meetings.

Temporal Trends of Persistent Organic Pollutants and Mercury in Landlocked Char in the High Arctic

How are levels of POPs and mercury changing over time and are leveis of new contaminants increasing?

LOCATION(S) OF WORK
1. Resolute Lake
2. Boomerang Lake
3. Sapphire Lake
4. North Lake
5. Aqiatusuk Lake
6. Char Lake
7. Lake Hazen
8. Amituk Lake

SCHEDULE
For more information please contact the project leader directly.

RELEVANCE:
Top predators in Arctic lakes, such as landlocked char, are good indicators of change in levels of **methylmercury (MeHg)** and **persistent organic pollutants (POPs)** due to the effects of **biomagnification** of these **contaminants**. These and other pollutants enter the Arctic atmosphere on air currents and can then be passed to lakes by snow and rain. An increase in precipitation has been shown to increase the input of contamination to Arctic lakes. Climate warming and the destruction of the ozone layer may increase the amount of precipitation in the Arctic, resulting in increased input of contaminants to Arctic lakes. Other effects of climate change may increase the occurrence of **mercury** depletion events (MDEs, described in the project *Air Measurements of Mercury at Alert*) which could also increase the amount of mercury deposited in Arctic lakes. This project is a continuation of a long running project investigating the temporal changes of contaminants through annual measurements in landlocked Arctic char. **Temporal trends** that are measured in the Arctic are useful in evaluating the effectiveness of international conventions to reduce global pollution.

PROJECT SUMMARY:
This project will investigate changes in the amount of contaminants measured in landlocked Arctic char over time. Fish from Resolute Lake, Char Lake, Lake Hazen and Amituk Lake will be analysed for POPs, such as polychlorinated biphenyls (**PCBs**), **chlorinated pesticides** (e.g. **DDT**), and **brominated flame retardants (BFRs)**. Sediment cores have already been collected from Amituk Lake and Char Lake to investigate historic trends of contaminant input to the lakes from the surrounding environment. The lakes mentioned above were chosen because temporal data has been collected for these lakes since the early 1990s. This allows the researchers to compare the trends of a lake from year to year. The goal of this project is to examine contaminant trends over a 10-15 year period for each of the lakes both individually and as an average. The project will also investigate factors that influence the levels of contaminants in landlocked char. Factors such as sampling time, water temperature, diet and climate warming will all be investigated. This year Arctic char will be collected at Resolute Lake, Boomerang Lake, Sapphire Lake, North Lake, and Aqiatusuk Lake.

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TIME FRAME:
A final report for the NCP will be completed by April 2005.

Northern Contaminants Air Monitoring: Organochlorine Measurements

What are the levels of POPs in Arctic air and how are the levels changing over time?

RELEVANCE:
The primary pathway for **organochlorine (OC) contaminants** to enter the Arctic ecosystem is through atmospheric air currents. Measurements of organochlorines (OCs) and polycyclic aromatic hydrocarbons (PAHs) in Arctic air began in 1992, and have become a continuing monitoring program under the **Northern Contaminants Program (NCP)**. The information collected through this research is used to negotiate international control agreements, such as the **Stockholm Convention**. Studies have shown that past-used **pesticide** concentrations have started to decline while pesticides that are currently being used have displayed relatively stable concentrations. Declining trends in past-used substances is a good indication that international controls can effectively result in decreased input of contaminants to the Arctic. Monitoring **temporal trends** of **persistent organic pollutants (POPs)** at Alert is a key commitment that Canada has made to assess the effectiveness of the Stockholm Convention. Evidence of new POPs in Arctic air will be critical for having these substances added to the Convention in the future.

PROJECT SUMMARY:
This project will measure contaminant concentrations in Arctic air at Alert, Nunavut, in order to determine whether atmospheric concentrations and deposition of contaminants in the Arctic are changing. Temporal trends will be considered in light of national and international initiatives, such as the Stockholm Convention, to determine if such initiatives are effective, or, in the case of new POPs, to see if a given substance should be added to the Convention. Particulate matter and gas phase contaminants will be sampled weekly and subsequently analysed for OCs, **polybrominated diphenyl ethers (PBDEs)**, and PAHs. Recently, the suite of chemicals measured by this project was revised to include PBDEs, endosulfan II, and 2 methyl-naphthalenes, which have become a growing concern internationally. This information is important at international negotiating tables in order to achieve appropriate restrictions on the release of certain pollutants.

LOCATION(S) OF WORK

Alert, Nunavut

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
Collection of samples at Alert and chemical and data analysis are ongoing. Submission of paper on update of temporal and spatial comparisons of POPs measured at NCP sites due January 2005.

Air Measurements of Mercury at Alert

What are the levels of input of atmospheric mercury in the Arctic ecosystem and are they changing over time?

RELEVANCE:

Mercury (Hg) is a high priority **contaminant** found at elevated levels in aquatic and marine animals in the Arctic. Its sources can include **anthropogenic** or natural contributions. Elemental mercury can remain in a vapour state for long periods of time but mercury that is found on particles or as a reactive gas has been shown to rapidly deposit onto snow and ice. The oxidation of gaseous elemental mercury into reactive gaseous mercury and particulate mercury has been shown to occur during polar sunrise in the Arctic spring. These mercury depletion events (MDEs) increase total mercury concentrations in the snow. The mercury that deposits onto snow and ice can eventually enter the **food chain** and traditional/country foods. This study will investigate whether atmospheric input of mercury in the Arctic is increasing or decreasing and further investigate the processes that govern mercury deposition.

PROJECT SUMMARY:

This study will measure **temporal trends** of atmospheric mercury in order to evaluate the role of the atmosphere in transporting mercury to the Arctic **ecosystem**. This project has been monitoring mercury since 1995, and collecting data that will help assess long-term changes in mercury levels. The changes in mercury concentration will aid in formulating a model of atmospheric pathways for mercury. Air samples will be investigated in order to determine how mercury is transformed and then deposited into the environment. Chemical and physical aspects will also be analysed in order to determine why these mercury events occur after polar sunrise. The study will establish whether global climate change has an impact on mercury in the Northern Hemisphere.

LOCATION(S) OF WORK

Alert, Nunavut

SCHEDULE

For more information please contact the project leader directly.

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TIME FRAME:

April 2004 - Barrow Field Study complete
July 2004 - Snow sampling complete
April 2005 - Report on interim results in the annual Synopsis Report. Continue measurements at Alert.

Passive Air Sampling for Persistent Organic Pollutants In Cold Environments

Can a device be engineered that is capable of collecting air samples in remote Arctic locations with minimal support?

RELEVANCE:
Previous studies have demonstrated that the atmosphere is the main route of transport for **contaminants** entering the Arctic **ecosystem**. Through this pathway, **persistent organic pollutants (POPs)** can be carried a great distance and can enter the Arctic **food chain**. This results in relatively high exposure to POPs among northerners who rely on a marine mammal diet. The method that is presently used to sample POP concentrations in the air involves active sampling. This system has three main disadvantages: it is expensive, labour intensive and requires electricity. These disadvantages limit extensive air sampling throughout the Arctic and the establishment of spatial sampling networks. This project is researching the development of a new system known as passive sampling that is able to filter contaminants directly from the surrounding air. Similar systems exist but have low sampling rates, limited precision and accuracy, and are unable to distinguish between POPs. The aim of this study is to create a system that can address the need for a better spatial resolution of the atmospheric concentrations of POPs in the Arctic, and one that could be used in a global POPs monitoring network. This work is important in helping to assess the effectiveness of international controls like the **Stockholm Convention**.

PROJECT SUMMARY:
This project will continue the development of an existing passive air sampler (PAS) in order to enhance its performance in Arctic conditions. Sampling capacity will be tested using varying types and configurations of air mixtures. If the PAS is shown to be effective under Arctic conditions, it will be tested alongside existing active samplers. If proven effective, passive air samplers developed through this project will eventually complement existing active sampling units in a global POPs monitoring network. This system will allow a greater area of land to be tested which will provide a better spatial model of POPs in the Arctic. Some other advantages that the new system will provide are the ability to time-integrate sampling over an extended period of time, independence from a power supply, and low production and operating costs. During this year the project will develop two different PAS designs under controlled and field conditions.

LOCATION(S) OF WORK

Alert, Nunavut

SCHEDULE
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TIME FRAME:
March 2004 - collection of winter-time field deployment samples of scaled-up samplers
June 2004 - finalize sampler design
Sept 2004 - completion of chemical analysis of samples
Oct 2004 - completion of laboratory testing
Jan 2005 - collection of samples from flow-through samplers
March 2005 - completion of sample analysis of samples from flow-through samplers

New Contaminants in Arctic Biota

What new contaminants have entered the northern environment and what are their effects?

RELEVANCE:
Research under phases one and two of the **Northern Contaminants Program (NCP)** focussed largely on "legacy **persistent organic pollutants (POPs)**", substances that are no longer widely used (e.g. **PCBs**) and that have been included in the **Stockholm Convention**. Since these substances are no longer in use, levels of all legacy POPs are generally in decline. Unfortunately, some new chemicals have begun to appear in the Arctic and have raised concerns about "new POPs" that are not currently included in the Stockholm Convention. Recent measurements of new POPs, most of which are still in use (e.g. polybrominated diphenyl ethers (**PBDEs**), suggest levels are on the rise. In order to address these concerns, more research will be carried out on new **contaminants** affecting the Arctic **ecosystem**. Current research will focus on detecting **temporal trends** for new pollutants, as well as expanding the number of animal species to be tested. Information on geographic variation is also very important and will aid in determining the pathways that deliver new contaminants to the Arctic. Most of the chemicals researched in this study have chemical characteristics that suggest the potential for **long-range transport** and **bioaccumulation** in top predators. The information collected for this project will aid Canadian and international assessments of new POPs.

PROJECT SUMMARY:
The project will focus on determining new chemical contaminants in Arctic seabirds, and will also determine the temporal trends for these contaminants. The seabirds will be captured from Prince Leopold Island for analysis. Some of the emerging chemical compounds in the Arctic include **brominated flame retardants (BFRs)**, **chlorinated naphthalenes (PCNs)**, **chlorinated paraffins (CPs)**, and fluorinated sulfonic and alkanoic acids. Seabirds will be analysed for BFRs, PCNs, short and medium chain CPs (SCCP/MCCP), **perfluoro acids**, and **neutrals**. The spatial and geographical trends of contaminants in the Arctic will be determined and will aid in identifying and prioritizing new contaminants entering the Arctic marine and freshwater environments.

LOCATION(S) OF WORK

1. Prince Leopold Island
2. Resolute (Qausuittuq)

SCHEDULE
For more information please contact the project leader directly.

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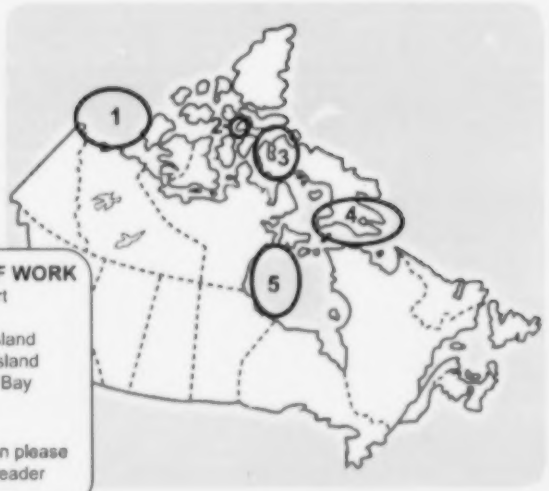
TIME FRAME:
May 2004 - extracts and tissue will be circulated
Aug 2004 - receive new collection of seabirds
mid-Sept 2004 - new collection will be circulated
Jan 2005 - preliminary results available
April 2005 - prepare final report

Temporal and Spatial Trends of Contaminants in Canadian Polar Bears: Part II

What are the levels of contaminants in polar bears from the Canadian Arctic and how are levels changing over time?

RELEVANCE:
The polar bear is the top predator in the Arctic marine **ecosystem**. Being at the top of the marine **food chain**, the polar bear has the potential to accumulate the highest levels of contaminants as a result of **biomagnification**. The polar bear was chosen for this research project because it met all the requirements of the **Northern Contaminants Program (NCP) II**: i) widely distributed species; ii) species which are important food items; iii) species for which long-term data sets exist; and iv) species which are highly exposed to contaminants. From the accumulated data, the research will assess the current **spatial patterns** of contaminants in polar bears. It will also determine if **temporal trends** observed in polar bears from Hudson Bay are similar to trends from bears in other parts of the Canadian Arctic.

PROJECT SUMMARY:
This project will involve the interpretation and publication of contaminant data on the spatial and temporal trends of **persistent organic pollutants (POPs)** from analysed tissues of polar bears collected across Canada in 2001-2002. This data set includes both legacy POPs, new POPs and some metabolites (e.g. methylsulfone **PCBs**). Stable **isotopes** of nitrogen and carbon will be measured in order to gain a better understanding of the difference in levels of contaminants between polar bears of different regions. Stable isotope measurements will help researchers determine what the bears' diet was before they were captured. This is a very important piece of information because the concentration of contaminants in a given organism is directly influenced by feeding habits.



LOCATION(S) OF WORK
1. Southern Beaufort
2. Resolute Bay
3. Northern Baffin Island
4. Southern Baffin Island
5. Western Hudson Bay

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
April 2005 - prepare final report and provide communities with the results of the studies

Temporal Trends of Heavy Metals and Halogenated Organic Compounds in Arctic Marine Mammals

Are contaminant levels in marine mammals changing over time?

RELEVANCE:
Previous studies have determined that the levels of **mercury** in the organs of northern marine mammals generally exceed the guidelines used to regulate the sale of, or develop advise for domestic consumption of fish. Studies have also shown that about half of the mercury entering the Arctic is **anthropogenic** in nature. Recent research activities have been used to determine **temporal trends**. This project addressed three issues highlighted in the **Northern Contaminants Program's (NCP's)** 2004-2005 Call for Proposals. The first issue addresses assessing levels and temporal trends of mercury and **persistent organic pollutants (POPs)** in western Arctic and Arviat beluga and narwhal from Arctic Bay, Broughton Island, and Pond Inlet. The last issue that the project will address is to assess levels and temporal trends of mercury and POPs levels in walruses from Iglulik, Inukjuaq, Akulivik, and Iqaluit.

PROJECT SUMMARY:
This project will assess long-term trends and will add to the current database on levels of **bioaccumulating** substances such as mercury and halogenated organic compounds. Three species, narwhal, walrus, and beluga, will be collected throughout the Arctic. Narwhal will be collected from Pond Inlet and Arctic Bay. Walrus will be collected from Hall Beach, Iglulik, and South East Baffin. Belugas will be collected yearly from 2004 to 2006 on Hendrickson Island. All species will be analysed for mercury and POPs. Some analyses will be carried out on archived samples of narwhal, walrus and beluga.

LOCATION(S) OF WORK
1. Pond Inlet
2. Arctic Bay
3. Hall Beach
4. Iglulik
5. South East Baffin
6. Broughton Island
7. Inukjuaq
8. Akulivik
9. Hendrickson Island

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
April 2005 - final report due to Northern Contaminants Program (NCP)

Temporal Trends of Persistent Organic Pollutants and Metals in Ringed Seals from the Canadian Arctic

What are the temporal trends of contaminants in Arctic ringed seals?

RELEVANCE:
In the 2004-2005 **Northern Contaminants Program's (NCP)** Call for Proposals it was noted that the **temporal trends** of **mercury** found in ringed seals were somewhat inconclusive. One of the goals for the NCP monitoring program is to establish reliable temporal trends for mercury. Temporal trend information is important for all **contaminants** in the Arctic so that the effectiveness of international controls can be assessed. This data will also provide valuable information needed to assess trends in dietary contaminant exposure among northerners. This project will assess temporal trends of **persistent organic pollutants (POPs)** and mercury in ringed seal. The project will also examine **spatial patterns** and temporal trends for new chemical contaminants such as **brominated flame retardants (BFRs)**, **chlorinated naphthalenes (PCNs)**, and **chlorinated paraffins (CPs)**. The information obtained through the research will assist Canadian and international assessments of new candidate POP substances for controls.

PROJECT SUMMARY:
This project will determine changes in the concentrations of contaminants, such as polychlorinated biphenyls (**PCBs**) and mercury in ringed seals. The project will also assess current levels and temporal trends of new contaminants. Before a long-term strategy for monitoring new contaminants can be developed they must first be identified and prioritized in the Arctic marine and fresh water environments. The seal samples which will be used in the research will be obtained from Resolute, Arctic Bay, Pond Inlet and Gjoa Haven. The blubber of female seals from Arviat, Resolute, Arctic Bay and Gjoa Haven will be analysed for PCBs, **organochlorines (OCs)**, **toxaphene** and polybrominated diphenyl ethers **(PBDEs)**. The samples from Pond Inlet, Arviat and Resolute will be analysed for metals such as mercury, **lead**, **arsenic**, **selenium**, and **cadmium**.

LOCATION(S) OF WORK
1. Arctic Bay
2. Resolute
3. Gjoa Haven
4. Pond Inlet
5. Arviat

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
March 2004-April 2005

Nunavik/Labrador

Nunavik/Labrador

Monitoring Spatial and Temporal Trends of Environmental Pollutants in Maternal and Umbilical Cord Blood in Nunavik

What trends can be observed in the levels of contaminants in Nunavik women and their infants?

RELEVANCE:
Several studies have monitored the exposure of Nunavik Inuit to **persistent organic pollutants (POPs)** and **heavy metals**. From these studies it was observed that Inuit are exposed to a wide range of environmental **contaminants** from the traditional/country foods they consume. Epidemiological and experimental studies on contaminants and their health effects suggest that exposure while still in the womb (prenatal exposure) is the time when people are most susceptible to harm from contaminants. In the past two years, international agreements have come into force and intervention programs put in place in order to decrease the input of contaminants into the environment, and decrease the exposure levels to humans and wildlife.

PROJECT SUMMARY:
The project will monitor prenatal exposure to **food chain** contaminants in Ungava communities and will assess **spatial patterns** and **temporal trends** of environmental contaminants in maternal and umbilical cord blood. The results will indirectly aid in testing the effectiveness of intervention programs and agreements to reduce contaminant levels that have been implemented nationally and/or internationally. The concentrations of contaminants in traditional/country foods will be measured and special attention will be given to the concentrations of newer contaminants. The project will also attempt to look at whether there is a link between the levels of exposure to contaminants and other personal, environmental and dietary factors.

LOCATION(S) OF WORK
Ungava Bay, Nunavik

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
April 2004 - March 2005

The Nunavik Health Study: Determination of Dioxin-like Compounds in Plasma Samples from Inuit Adults using the DR-CALUX Bioassay

Are diet and chronic diseases among Nunavimmiut related to exposure to dioxin-like compounds?

RELEVANCE:
It has been shown that compounds with a chemical structure similar to **dioxin** are very **toxic** substances and can cause a variety of harmful effects. Little research has been done on the exposure of Canadian Inuit to these compounds, and there is no information available on possible adverse health effects. It is known that Inuit residing in the Arctic are more highly exposed to **organochlorines** through their traditional diet. The project will provide data on the levels of dioxin-like compounds (DLCs) in the body. This data will be used to test whether DLCs are involved with chronic diseases, such as diabetes and **cancer**.

PROJECT SUMMARY:
This project will analyse 1000 plasma samples collected from Inuit adults participating in the Nunavik Health Study. These analyses will involve determining the concentrations of DLCs in the samples, and investigating the relationship between these compounds and other **persistent organic pollutants (POPs)**. The analysis will be carried out on a Dioxin-Receptor Chemically-Activiated Luciferase Expression (DR-CALUX) **bioassay** because it has been proven to be very cost effective and quick in comparison to conventional methods. These characteristics make the method particularly attractive when dealing with large samples. The project will also attempt to relate DLC plasma levels to dietary habits in the North, and relate contaminant levels to the incidence of chronic diseases.

LOCATION(S) OF WORK

1. Nunavik
2. Québec City, Québec

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
April 2004 - March 2005

Inuit Health in Transition Study: the Nunavik Health Study

How have recent temporal trends of certain contaminants affected the health of the Nunavik population?

RELEVANCE:
Various studies have been conducted in Nunavik over the past decade to characterize the exposure of Inuit populations to **contaminants**. There are two main groups of contaminants that may affect human health: **heavy metals** and **persistent organic pollutants (POPs)**. The main route of exposure is through the consumption of traditional/country foods and such consumption may, in certain cases, pose a health risk. However, these foods also have many benefits such as providing protein, vitamins, minerals and omega-3 fatty acids in the diet. This study will provide Inuit of Nunavik with updated information on contaminant exposure which will assist making good decisions on food use.

PROJECT SUMMARY:
This project will determine **temporal trends** of contaminants using new data and data obtained in 1992 by the Santé Québec Study. Three objectives have been laid out. The first will be to verify the temporal trends of contaminant exposure of Nunavik Inuit by measuring contaminant levels, traditional/country food consumption, and protective and beneficial nutritional factors. The second objective will be to begin monitoring new contaminants of concern in northern regions, e.g. **brominated flame retardants (BFRs)**, polybrominated diphenyl ethers (**PBDEs**), **chlorinated paraffins (CPs)**, **polychlorinated naphthalenes (PCNs)**, and **perfluorooctane sulfonate (PFOS)**. The last objective is to investigate the effects of contaminants on chronic diseases.

This study will contribute to an international Inuit cohort study which will gather information regarding the health of the Inuit population of interest. In Canada, this population consists initially of permanent adult residents of Nunavik who will be examined for **PCBs**, **mercury**, and new emerging contaminants. Data on food and nutrient intake will be obtained using a food frequency questionnaire. The basic design of this project is to perform a survey on approximately 10,000 Inuit living in Alaska, Nunavut, Nunavik, Greenland and Denmark. This circumpolar cohort study will focus on chronic diseases such as cardiovascular diseases and **cancer**.

LOCATION(S) OF WORK
Québec City, Québec

SCHEDULE
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TIME FRAME:
spring 2004 - pilot study in Nunavik
Aug-Oct 2004 - data collection

Providing Contaminants Information in the Context of Regional Environmental Health Initiatives: Communications in Nunavik

What is the best way to communicate contaminants information back to the communities in Nunavik?

RELEVANCE:
Traditional/country food is viewed as an anchor for cultural and personal well being in the North. Recently, it was discovered that an association exists between subtle neurodevelopmental effects in Inuit infants and the consumption of traditional food by their mother during pregnancy. The Nunavik Nutrition and Health Committee (NNHC) has an obligation to inform the regional communities about what is being done, why it's being done, and what is being found. This information will enable the Nunavimmiut to make informed decisions regarding their diet and will also help identify future research and information needs. This project will support community understanding of environment and health research conducted in the region.

PROJECT SUMMARY:
This project will gather and develop communication materials, which will be useful in communicating recent results and their meaning to the communities. A new booklet will be published on contaminants, environment and health in Nunavik. This material will be presented to the communities during the Nunavik Health Survey and will be presented by the NNHC representatives. Other activities that have been planned are short presentations to interested community groups, information handouts, and a consultation. The communications survey conducted in 2003-2004 will be analysed and the results will be delivered and discussed with the communities. The ultimate goal of the project will be to develop a long term communications strategy/plan for Nunavik.

LOCATION(S) OF WORK
Nunavik communities

SCHEDULE
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TIME FRAME:
August - September 2004 - conduct Nunavik Inuit Health Survey
August - October 2004 - collect the data
Mid-February - deadline

Communicating in Labrador on Contaminants: Responding to Community Specific Concerns and Development of a Long Term Strategy to Engage Target Audiences on Contaminant, Food and Health Issues

What is the most effective way of communicating past results to Labrador Inuit communities?

RELEVANCE:
The main diet of the Labrador Inuit consists of land animals, birds, plants and fish of the region. Current research results, found in the **Canadian Arctic Contaminants Assessment Report II (CACAR II)** have shown that these food sources may contain certain **contaminants** due to long- and short-range atmospheric pollution. Research in Nunavk has also shown subtle effects on unborn children due to the mother's intake of contaminants in traditional/country foods as well as benefits from these same foods. The main issues for Labrador Inuit will be to understand recent CACAR II and Nunavik results. This will require materials and messages to be developed in response to the specific concerns identified. This project will help Labrador Inuit make better informed decisions about their consumption of traditional/country foods.

PROJECT SUMMARY:
This project will enable communities of the north coast of Labrador and the Lake Melville area to become more involved with contaminant issues. This year the project looks to develop regional and community specific communication messages and materials to inform the Labrador public of research activities and results. A review followed by communication of the results from the 2003-2004 Inuit Communications Survey will take place. Young women will be the main target of the communication efforts to ensure they are informed about contaminant and health issues. In general, the project hopes to develop regional long-term communication strategies for contaminants, traditional/country foods and health issues.

LOCATION(S) OF WORK

Labrador (north coast and Lake Melville areas)

SCHEDULE
For more information please contact the project leader directly.

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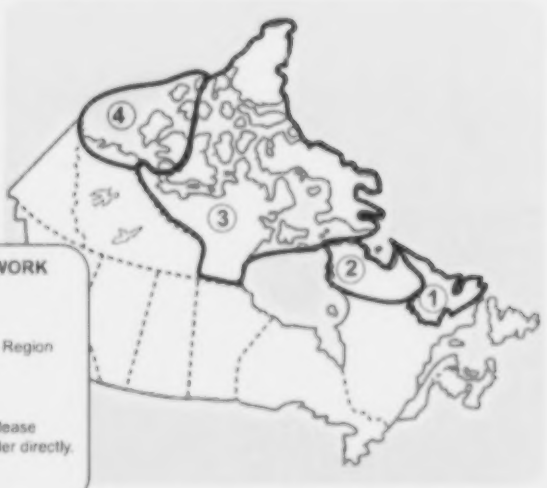
TIME FRAME:
Mid-February 2005 - regional framework available for ITK

Communicating about Contaminants into the Future: Analysing the Inuit Communications Survey and the Establishment of an Inuit Strategic Plan

Can long-term programs be established enabling researchers to plan out the best direction the project will take for future research projects?

RELEVANCE:
The **Northern Contaminants Program (NCP)** has been operating for many years, which allows a degree of continuity in the research and communication efforts being performed. The NCP, the Aboriginal Partners, and the regional representatives have done very well in delivering most of the information that arises from the research. There has been a recent increase in the amount of information regarding the potential effects of **contaminants** on infant health and development in high exposure regions. The communication efforts have become more difficult and complex to convey due to the subject matter. This project proposes to form an Inuit Communications Working Group to discuss future communication and research plans.

PROJECT SUMMARY:
This project will develop a formal Inuit Communications Blueprint and a long-term national Inuit communications strategy. This will help organize and facilitate long-term strategies to be led by the Inuit Communications Working Group. A significant activity planned for this project will be to collect, enter and analyse data from the Inuit Communications Survey. The Working Group will meet four times throughout the year to review the results. The analysis of these results will aid in establishing a long- and short-term communications plan. These results will be delivered through the production of regional and national reports and given to regional representatives for distribution.



LOCATION(S) OF WORK
1. Labrador
2. Nunavik
3. Nunavut
4. Inuvialuit Settlement Region

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
April 2004 - March 2005

Nunavik Nutrition and Health Committee Communications and Coordination Program

How can information from contaminant research be best communicated to communities in Nunavik?

RELEVANCE:
In 1988 the **PCB** Resource Committee was established and has since changed its name to the Nunavik Nutrition and Health Committee (NNHC). The name was changed to reflect the group's changing perspectives as they took on a more holistic approach to environmental and health issues, including both benefits and risks. It is the authorized review and advisory body for health and nutrition issues in the region and provides guidance and liaison services for researchers and agencies. The public also receives communications and education material from the committee on health and environment topics and research projects. Overall, the committee represents Nunavik's interests at the national and international level.

PROJECT SUMMARY:
The general objective of the NNHC will be to address regional communication needs and provide the information necessary for the public to understand the data relevant to environmental health and contaminants issues in Nunavik. The NNHC will focus this year on follow-up communication strategies for the general public and young women, especially those of child-bearing age. This year, the committee will specifically provide the general population and health workers with background information in order to help them understand environmental health, nutrition, and contaminant research issues and results. It will also compile public concerns and work to direct research to best answer these concerns. The NNHC will also help the researchers translate their data into a format meaningful to the public. The committee is also able to set up partnerships for various research and intervention activities.

LOCATION(S) OF WORK
Nunavik

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Other Locations

Other Locations

Characterising Risks Associated with Fetal Exposure to Methylmercury

Is there a time period in the development of the brain when it is more sensitive to contaminants and, if so, when?

RELEVANCE:
The brain of the developing fetus undergoes a series of developmental stages during growth, some of which are more sensitive than others to **contaminants** or pharmaceutical drugs taken by the mother. A previous study has shown that pregnant women who regularly consume a lot of marine fish with low levels of **mercury** usually have children with no signs of health problems. In contrast, pregnant women who consume less fish but overall ingest more contaminants sometimes have children who show subtle symptoms that may be linked to contaminants. This project will be using mice to gain a better understanding of how mercury may be causing some of the observed **toxic** effects.

PROJECT SUMMARY:
This project seeks to gain insight into how **methylmercury** is transferred from the mother to the fetus during pregnancy. Pregnant mice will be dosed with mercury which researchers will then track as it travels through their bodies. This part of the study will be followed by another in which common mercury (not tracked) will be used. The mouse pups will be raised in order to determine if any problems arise which affect their **neurobehavioural** abilities. The results from these and other experiments will aid in the development of a mathematical analysis model that will be used to determine the rates of absorption, distribution, and elimination of methylmercury, and thus aid in the development of guidelines for human exposure to methylmercury during pregnancy.

LOCATION(S) OF WORK
Ottawa, Ontario

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Assessment of Archived Human Samples Collected in Northern Regions for the Brominated Flame Retardant, Hexabromocyclododecane (HBCD)

What are the temporal trends for HBCD in the Arctic region?

RELEVANCE:
Over the years flame retardants have become more widely used in materials such as carpets, textiles, electronics and plastics. The current estimate of production is 200,000 tons a year of **brominated flame retardants (BFR)**, one of the more important classes of these "new" contaminants. BFRs are further divided into polybrominated diphenyl ethers (**PBDEs**), tetrabromobisphenol A, and **hexabromocyclododecanes (HBCD)**. HBCD is known to **biomagnify** in **food webs** but has not been found to be **toxic** as a result of short-term exposure. PBDEs are known to exist in remote regions such as the Arctic, and **bioaccumulate**, making them a prominent new **persistent organic pollutant (POP)**. Health Canada is currently investigating the extent and degree to which PBDEs are present in archived northern human blood samples. HBCD will be the main focus of this project because of the lack of research information on its presence in the North.

PROJECT SUMMARY:
This project's main objective is to obtain, for the first time, information about HBCD exposure in northern populations. Twenty-three human blood samples, collected during 1994 - 1999 from different northern populations, will be purified and the concentration of HBCD will be determined. Forty extracts of human (Inuit) milk, collected during 1989 - 1900 and 1996 - 2000, will be purified and the concentration of HBCD will be determined. Additional analytical data will be generated from a related project on human milk samples collected in southern regions. This data set will be used to compare northern and southern regions and trends.

LOCATION(S) OF WORK

Ottawa, Ontario

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Long Term Effects Following Post-natal Exposure to Breast Milk Contaminants: Are They Real?

What are the potential health effects of being exposed to a mixture of contaminants during breastfeeding?

RELEVANCE:
Breast milk is a very important part of an infant's diet, providing immune system, developmental, and psychological advantages. However, research data have shown that the levels of **PCBs** and **DDE** in breast milk and cord blood are higher in Inuit of north eastern Canada than in other Canadians. This is a very important finding because the body burden of these **dioxin**-like compounds that accumulate during breastfeeding may be enough to last until adulthood. Despite these findings, breastfeeding is still believed to be, by far, the best method to nourish a new born baby. This project will assess the potential health risks associated with postnatal exposure to mixtures of breast milk **contaminants**.

PROJECT SUMMARY:
This project will combine the most abundant and most **toxic organochlorines** with **methylmercury** and test on rats the effects of pre- and postnatal exposure. Three different mixtures will be tested: the most abundant contaminants; the most toxic contaminants; and a mixture of all 37 contaminants selected for this study. For each mixture, immediate toxicity effects will be assessed after 21 days, and residual effects will be assessed after 50 days. The project will also be involved in determining the health effects of post-natal exposure to breast milk contaminants without prior exposure.

LOCATION(S) OF WORK

Ottawa, Ontario

SCHEDULE
For more information please contact the project leader directly.

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TIME FRAME:
April 2004 - March 2005

Developmental Neurotoxicity of a Persistent Organic Pollutants (POPs) Mixture Mimicking the Exposure of Canadian Northern Populations

How does a mixture of contaminants affect the human body?

LOCATION(S) OF WORK

Ottawa, Ontario

SCHEDULE

For more information please contact the project leader directly.

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TIME FRAME:
April 2004 - March 2005

RELEVANCE:

Persistent organic pollutants (POPs) have been shown to lead to **neurobehavioural** effects and changes in brain **gene expression** (i.e. changes to a brain gene on its active state). Better knowledge of the mechanisms (at the molecular level) that underlie the effects of **neurotoxicants** is essential for improving risk assessments of vulnerable human populations (e.g. infants and children) to these chemicals. Currently, the majority of toxicological studies are performed using a single chemical compound, which is an oversimplified approach to a much more complex problem. The fact is, human populations are continuously exposed to a multitude of pollutant mixtures. This project, along with *Characterising Risks Associated with Fetal Exposure to Methylmercury*, will research the effects of pollutant mixtures on behaviour caused by changes in the nervous system, brain chemistry and systemic outcomes.

PROJECT SUMMARY:

This project will investigate the biological mechanisms underlying the effects of environmental neurotoxicants, in a laboratory study using rats. In order to achieve this goal, four short-term objectives have been planned for the year. The first objective will study the effects of perinatal exposure to **PBDEs** and other previously studied **contaminants**. Relative gene expression and changes to the concentration of proteins will be carefully observed in the rats. The second objective will compare contaminant-induced changes in brain gene expression and protein concentration. The third objective will compare the effects of PBDE exposure on certain measurements of brain molecules. The final objective will correlate molecular data to the neurobehavioural effects in order to determine how changes in gene expression have led to the negative neurobehavioural effects. This project will lead to better understanding and new tools essential for improving risk assessments for vulnerable populations such as pregnant women, infants and children.

Interactions Between Northern Contaminants and Omega-3 Fatty Acids and Selenium in Central Nervous System Development

Do the beneficial attributes of traditional/country food outweigh the risks?

RELEVANCE:
The Inuit traditional diet is rich in omega-3 fatty acids and **selenium**, which are both considered part of a healthy diet. However, the presence of **methylmercury (MeHg)** and **organochlorines (OCs)** may cause some health problems as a result of exposure while still in the womb. **Selenium**, however, has been shown to counteract the effects of mercury in some experiments with animals, and an on-going study of Canadian Inuit infants indicates that omega-3 fatty acids are beneficial to infant growth and neurological development. This project will focus on assessing the effects of selenium and fish oil supplemented diets on developmental **toxicity** caused by fetal exposure to methylmercury (MeHg).

PROJECT SUMMARY:
This laboratory project will use mice to evaluate the beneficial effects of omega-3 fatty acids and selenium on fetal brain development exposed to MeHg and OCs. For this year, the research goal will be to evaluate the effects of dietary fish oil supplements, in combination with or without selenium, on developmental toxicity ***in utero*** associated with MeHg. The MeHg burden will be determined in the brains and livers of newborn mice exposed to the **contaminant**. The survival of the offspring will be assessed along with the **neurobehavioural** effects in adult offspring. The results obtained will be compared with previous research in which the mice did not receive a fish oil supplemented diet. The results of this study are expected to provide experimental evidence supporting the benefits of the traditional Inuit diet on brain development, despite the presence of contaminants in that diet.

LOCATION(S) OF WORK
Sainte-Foy, Québec

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Exposure to Polybrominated Diphenyl Ethers (PBDEs) in Sprague-Dawley Rats

What are the effects of exposure to PBDEs on fetuses and infants?

RELEVANCE:

Polybrominated diphenyl ethers (PBDEs) are a group of chemicals that are used as flame retardants in thermoplastics, polymers and textiles. Exposure to this group of chemicals has increased dramatically in North America, especially in the Arctic region. There is evidence showing that PBDEs are being deposited in the Arctic via **long-range transport** and they have also been found in traditional/country food. The adverse effects of PBDEs are not well known but are believed to include **neurobehavioural** and thyroid effects, and **cancer**. This project will examine the impact of PBDEs during the life of an exposed animal and determine the persistence of health effects as well as the potential for new adverse health effects that emerge as the animal matures.

PROJECT SUMMARY:

This project will gather information on the health effects, especially in the nervous and endocrine systems, caused by PBDEs in the fetuses and newborns of young rats. This knowledge will be helpful for developing guidelines and tolerable daily intakes for pregnant women and infants. In the first year, this project will look at the **neurotoxicological** effects of DE-71 exposure in the womb and from breastfeeding to. DE-71 is a commercial mixture of polybrominated diphenyl ethers. The levels of PBDEs in the brain and blood tissue of the young rats will be determined. In order to determine the persistence of the health effects and whether other neurotoxic health effects will occur later in life, the project will also assess neurotoxicological effects during early development, in juveniles, and in adults.

LOCATION(S) OF WORK

Ottawa, Ontario

SCHEDULE

For more information please contact the project leader directly.

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TIME FRAME:

February 2004 - early behavioural test data available
April 2004 - all behavioural test data available

In Vitro Examination of Food-Borne Polychlorinated Pesticide Residues

What are the environmental and health effects of chlordane and toxaphene in the Arctic?

LOCATION(S) OF WORK

Ottawa, Ontario

SCHEDULE

For more information please contact the project leader directly.

RELEVANCE:

Chlordane and **toxaphene** are **pesticides** produced as complex mixtures of related polychlorinated compounds. Both mixtures have been very popular pesticides and their usage has grown since the discontinuation of **DDT**. Recently, concerns have been voiced about the environmental and health effects of these pesticides because of some of their chemical properties. Both are known to be active over long periods of time and to be very stable compounds, which is part of the problem, but also contributes to their popularity. Both pesticides have been found in the Arctic food chain and have been identified as **persistent organic pollutants (POPs)**. It is believed that they travel via air currents to reach the distant Arctic environment. This project will examine the major persistent types of chlordane and toxaphene for their effects on giving rise to the activation of **enzymes** used to break down drugs, and their direct effects on enzyme activity.

PROJECT SUMMARY:

This project will characterize the effects of exposure to polychlorinated pesticide-related residues on enzyme expression - the activation of an enzyme - and activity - what the enzyme does. In the first year, the project will determine the effects of compounds, related to major persistent chlordane and toxaphene on the activation of enzymes. It will also determine the direct effects of the persistent **organochlorines** on specific human enzyme activities. The results from these studies will enable research to perform further molecular-base studies. These studies will be used to examine the mechanisms by which polychlorinated pesticide residues exert their effects on enzymes.

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TIME FRAME:
April 2004 - March 2005

Developmental Immunotoxicity of a Commercial Polybrominated Diphenyl Ether (PBDE) Mixture

What are the potential human health effects of PBDEs?

RELEVANCE:
Polybrominated diphenyl ethers (**PBDEs**) are used as flame retardants in plastics, building materials, carpets, and electronic equipment. Half of the global consumption takes place in North America and many Arctic marine mammals and fish have shown an increase in PBDE residues. It is believed that the major route of human exposure is through food. PBDEs are now being regarded as an emerging **contaminant** in the Arctic. However, there is no evidence indicating that Aboriginal people are exposed to higher levels than southerners. The potential for PBDEs to regulate the **immune system** of young rats, during their perinatal stage, will be examined in this project.

PROJECT SUMMARY:
This project will observe the health effects of PBDEs on rodents to gain a better understanding of how these chemicals might affect humans. To accomplish this goal, male and female rats will receive daily dosages of PBDEs 10 weeks before mating. Pups will be exposed to PBDEs for another 42 days post-weaning to cover the entire juvenile development period. The immune function in these rats will be assessed during the lactation and post weaning periods. The residue levels found in the milk of the mothers will also be tested in those rats who were exposed to PBDEs during pregnancy and lactation. Ultimately, the project should determine if the levels of PBDEs in human blood, tissue and breast milk are similar to the levels found in rodents under the same conditions.

LOCATION(S) OF WORK

Ottawa, Ontario

SCHEDULE
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TIME FRAME:
April 2004-March 2004 - completion of the animal phase of the project.

Decision Support Tool for Risk and Benefit Balancing of Country Food Issues in the Canadian Arctic

Can health care workers be helped in making decisions about traditional/country food use by using a decision support tool?

RELEVANCE:
In the North, traditional/country food is seen as the anchor for cultural and personal well being. It is an essential part of the nutritional and social health of northern Aboriginal people. Due to the fact that the majority of traditional/country food is composed of local wildlife, it is not surprising that it provides the greatest source of protein to the northern diet as well as vitamins and essential elements. In Nunavik it has also been discovered that almost 80% of the intake of **chlorinated pesticides** and **PCBs** originate from the consumption of certain traditional/country foods. The project proposes to develop an easy-to-use tool that incorporates the most relevant benefit-risk balancing methodologies to aid health professionals provide accurate advice to northerners about their diet.

PROJECT SUMMARY:
This project will address the need to develop methods that will aid health care professionals balance the benefits and risks associated with the consumption of traditional/country foods. This project will involve adapting a preliminary version of an existing decision model developed for the general use of food security in the North. It will also be refined to include quantitative and qualitative data and will be reviewed by northern health experts, other decision makers, and undergo a peer review by scientific experts. This model will be oriented towards incorporating qualitative and quantitative benefits and risks associated with traditional/country food consumption, **contaminants**, nutrients, and social and cultural benefits.

LOCATION(S) OF WORK

1. Québec City, Québec
2. Ottawa, Ontario

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Education and Communication Priority Projects: International Contaminant Activities in Support of Global Instruments and Activities

How do Canada's efforts in controlling POPs compare internationally?

RELEVANCE:
In 1988, very few people understood the significance of transboundary pollution and its relation to **persistent organic pollutants (POPs)**. Over the last several years the **Northen Contaminants Program (NCP)** has provided a lot of the scientific justification that has been used at international negotiation tables to address the issue of **long-range transport** of **contaminants**. The **Stockholm Convention** and the Long-range Transboundary Air Pollutions (LRTAP) Convention are examples of the international agreements that have arisen due to such research. Canada is highly involved in these agreements as it is concerned with protecting our environment. This project will aid Canada in meeting its obligations under the Stockholm and LRTAP Conventions.

PROJECT SUMMARY:
This project will complete a comparison and analysis of Inuit-specific **Canadian Arctic Contaminants Assessment Report (CACAR)** contaminants data with globally published data. A fact sheet on international dietary messaging will also be prepared and compared to those of other Arctic countries. The project looks to create an information package which will contain the draft CACAR methods and experiences so that other countries may use it as a guideline to create their National Implementation Plans (NIP). The Inuit Circumpolar Conference (ICC) will assist Inuit Tapiriit Kanatami (ITK) with the contaminants work by providing them with communication material on international activities related to contaminants.

LOCATION(S) OF WORK
International

SCHEDULE
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TIME FRAME:
April 2003 - March 2004

ITK General Inuit Communications Package

Will the general information package being composed be useful in all Inuit regions?

RELEVANCE:
The **Northen Contaminants Program (NCP)** has recently began a new phase which will focus on communicating results to the northern communities. Various methods have been implemented to communicate **contaminants** information to the Inuit regions. Recently Inuit-specific material has been produced and has proven to be extremely effective in communicating contaminant information. However, some of these region-specific materials are also very valuable to other Inuit regions. The Inuit Tapiriit Kanatami (ITK) proposes to gather and review Inuit-specific materials produced and assemble a general Inuit Communications Package of this material. Once completed this material will be translated into all the regional dialects and sent to all the Inuit regions.

PROJECT SUMMARY:
This project will identify and gather communication materials that pertain to contaminant and traditional food issues in Inuit regions. The materials will then have to be reviewed and important new materials will have to be identified. The existing materials will have to be updated to include current research results and translated into the different Inuit dialects. All materials will also be adapted to provide a common 'look and feel'. Any new material that hasn't been thoroughly developed into a format which can be distributed to the general public will have to be put into a plain language format. All the information will then be compiled into a General Inuit Communications Package.

LOCATION(S) OF WORK:
Ottawa, Ontario

SCHEDULE:
For more information please contact the project leader directly

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TIME FRAME:
April 2003 - March 2004

Coordination and Administration of the Northern Contaminants Program (NCP)

How is the Northern Contaminants Program administered?

RELEVANCE:
Since 1991, Indian and Northern Affairs Canada (INAC) has provided the **Northern Contaminants Program (NCP)** with financial administration and management services to support many scientific and northern-related projects. These administration and management services enable the central co-ordination of the program among four federal departments, four Aboriginal organizations, departments from three territorial governments, and approximately 12 universities and research institutes. INAC also provides secretariat support for the project review teams. This management structure ensures that the program remains scientifically defensible while, at the same time, achieving real progress in terms of its broad policy objectives.

PROJECT SUMMARY:
INAC headquarters will continue to offer financial and secretariat support to, and overall co-ordination of, the NCP. This will include at least two Management Committee meetings and various ad hoc meetings and workshops. INAC will also co-ordinate and implement various communications activities with the Aboriginal organizations and the territorial contaminants committees. Some highlights of activities this year include: developing new Blueprints for the Human Health; Environmental Trends; and Education and Communications subprograms of the NCP; producing the annual Synopsis Report of research results and holding the Results Workshop; facilitating production of **Canadian Arctic Contaminants Assessment Report II (CACAR II)** results in scientific journals; maintaining and updating the NCP website; further development of the database of current and past NCP projects; and implementing the online proposal submission and management system.

LOCATION(S) OF WORK
Gatineau, Québec

SCHEDULE
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TIME FRAME:
Ongoing to March 2005

Contributing to International Controls on POPs and Mercury

Can a model be created that can predict the transport and fate of POPs and mercury globally?

LOCATION(S) OF WORK

International

SCHEDULE

For more information please contact the project leader directly.

RELEVANCE:

In May 2004 the **Stockholm Convention** entered into force thereby implementing international controls on the manufacturing and use of 12 **persistent organic pollutants (POPs)**. In the future, this agreement may be amended to include new POPs that are shown to persist in the global environment and, in particular, in the Arctic. In order for a country to propose adding a new POP to the Convention, the substance must first be proven to be **persistent**, **toxic**, **bioaccumulative** and subject to **long-range transport**. The NCP is working to identify and assess a number of new POPs through the current research being conducted in the Arctic. The information obtained through this research may be used at international negotiation tables in order to demonstrate that certain new chemicals behave like POPs and are being deposited in the Arctic. The development of global **contaminant** models will help to predict which new chemicals are capable of being deposited in the Arctic. These models can also predict where contaminants come from, how they move around the world and end up in the Arctic and, how long they will take to disappear once they are banned.

PROJECT SUMMARY:

This project will continue to model the sources and fate of POPs and **mercury**. These computer models will aid in international negotiations to reduce emissions of contaminants that are or may be of future concern to the Canadian Arctic **ecosystem**. Three tasks will be implemented in order to improve the understanding of mercury transport on a global scale. These tasks include: integrating the Canadian Environmental Modelling Centre's (CEMC) multi-species model with the Berkeley-Trent (BETR)-World model; working with other researchers to compile a detailed, spatially and temporally explicit global **anthropogenic** mercury emissions database; and validating the modelled results against the database.

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TIME FRAME:
April 2005 - final report due to **Northern Contaminants Program (NCP)**

Facilitation of International Action Related to the Long-Range Transport of Contaminants into the Arctic

What international negotiations is Canada undertaking in order to control the transport of contaminants in air and water to the Arctic from outside sources?

RELEVANCE:
International action is required to stop the transport of **contaminants** to the Canadian Arctic and to reduce the accumulation of contaminants in northern **food chains**. This can only be achieved by identifying where the contaminants are coming from and by reducing or eliminating their use at these sources through international agreements, such as the **Stockholm Convention**, that would limit production and use of these contaminants.

PROJECT SUMMARY:
This project will identify long-range contaminant sources and the transport pathways through programs such as the Arctic Monitoring and Assessment Programme (**AMAP**). It will also assist in implementing and developing appropriate international controls for emissions and discharges. Reduction and elimination of contaminant input to the Arctic from distant sources outside of Canada requires comprehensive international co-operation, which includes:

1. Facilitating implementation of the 1998 Aarhus **persistent organic pollutants (POPs)** and **Heavy Metals** Protocols under the convention on Long-range Transboundary Air Pollution (LRTAP)

2. Facilitating implementation of the 2001 Stockholm Convention on POPs and associated global actions on POPs.

LOCATION(S) OF WORK
Gatineau, Québec

SCHEDULE
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TIME FRAME:
April 2004 - March 2005

Appendices

Appendices

Glossary

ABIOTIC
An abiotic environment refers to the non-living natural environment made up of non-living, **inorganic**, objects such as rocks and minerals.

AMAP
The Arctic Monitoring and Assessment Programme (AMAP) is an international organization established in 1991 to implement components of the Arctic Environmental Protection Strategy (AEPS). Now a programme group of the Arctic Council, AMAP's current objective is "providing reliable and sufficient information on the status of, and threats to, the Arctic environment, and providing scientific advice on actions to be taken in order to support Arctic governments in their efforts to take remedial and preventive actions relating to contaminants".

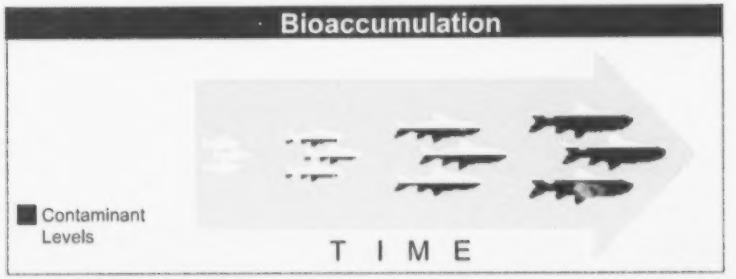
ANTHROPOGENIC
Originating from human activity.

ARCHIVED
Archived samples are samples (e.g. animal tissues or organs) that are stored, usually in freezers, for future analysis.

ARSENIC
Arsenic is a steel grey, brittle metallic element that is found naturally in rocks and soil. Some of its compounds are poisonous and are used as agricultural **insecticides** and poisons. Arsenic can **bioaccumulate** in plants and animals.

BENTHIC
The benthic layer is the sediment and mud found at the bottom of lakes, rivers and oceans. Benthic organisms live on the bottom or in these sediments. Pelagic organisms live in the water column.

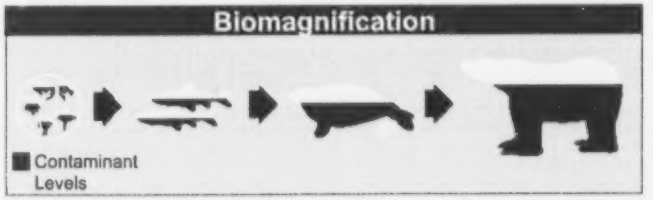
BIOACCUMULATE (BIOACCUMULATION)
Bioaccumulation is the build-up or storage of substances (such as **contaminants**) in the bodies of animals over time. Bioaccumulation of contaminants can occur by one organism eating another or drinking water that contain these contaminants. Contaminants that bioaccumulate are very slow to change or do not change to a chemical form that can be digested and eliminated by the animal.



BIOASSAY
The appraisal of the biological activity of a substance by testing its effect on an organism.

BIOAVAILABILITY
A chemical is bioavailable when it is in a form that can be taken up or absorbed by plants and animals.

BIOMAGNIFY (BIOMAGNIFICATION)
When an animal eats a plant or another animal, it consumes all the contaminants stored in that food. Contaminants can biomagnify in animals that use other animals for food because the concentration increases with each step from prey to predator.



BIOMARKER
A biomarker is a certain biological element that undergoes change when exposed to a stressor, such as chemical contamination. Biological chemicals such as **enzymes** are common biomarkers used to detect exposure to contamination as well as subtle (non-serious) biological effects caused by **contaminants**.

BIOMONITORING
Biomonitoring is a method of testing and monitoring different **contaminants** in the environment through living organisms. For example, polar bear tissue may be analysed as a way of biomonitoring **POPs** in the Arctic marine environment.

BIOTA
The animal and plant life (i.e. living things) of a region.

BIOTIC
A biotic environment refers to living organisms in the environment.

BROMINATED FLAME RETARDANTS (BFR)
Brominated flame retardants are a group of organic compounds that are commonly used in synthetic materials to decrease flammability. BFRs are found in many plastics and foams that are used in products like car parts, computers and household furniture. Three subgroups of BFRs are:

- Aromatic, including tetrabromobisphenol A (TBBPA), **polybrominated diphenyl ethers (PBDEs)** and **polybrominated biphenyls (PBBs)**
- Aliphatic, which are in general used in relatively small quantities
- Cycloaliphatic, including **hexabromocyclododecane (HBCD)**

BROMINE (BROMINATED)
Bromine is a naturally occurring element. It is a dense, deep reddish brown liquid that is easily vaporized into a brownish-red **vapour**. It occurs mainly as the bromide ion, Br-, in salts in seawater and in many saline springs. Metal bromides occur in small amounts in seawater and salt deposits as well as in water from mineral springs. One of the most common uses of bromine is for the manufacture of bromine compounds used in gasoline. Bromine compounds are also widely used in **pesticides** and for treating plastic material and textiles to make them fireproof.

CADMIUM
Cadmium is a **heavy metal** found naturally in soils and rocks. It is soft and has a silvery colour. It is mined and used in some industries to make things such as batteries, some **pesticides**, and some types of paint.

CANDIAN ARCTIC CONTAMINANTS ASSESSMENT REPORT II (CACAR II)
This report, also referred to as CACAR II, is a comprehensive assessment of **contaminants** in the Arctic. CACAR II contains detailed results of all the research that was conducted during the second phase of the **Northern Contaminants Program** (1998-2003).

CANCER
Cancer is a disease that results in uncontrolled, abnormal growth of the body's cells resulting in tumours (large masses of cells).

CHLORDANE
Chlordane is a colourless, odourless **POP** used as an insecticide. It can affect the nervous system of humans and wildlife. Chronic exposure to humans can cause liver damage and possibly cancer. It is currently restricted in use for such things as termite control and non-food plants.

CHLORINATED PARAFFINS (CPs)

Chlorinated paraffins (CPs) are chlorinated derivatives of n-alkanes, having carbon chain lengths ranging from 10 to 38, and a chlorine content ranging from about 30 to 70% (by weight). The melting point of CPs increases with increasing carbon chain length and with increasing chlorine content. It has also been found that **toxicity** or environmental effects can vary depending on the chain length.

CHLORINE (CHLORINATED)

Chlorine is a naturally occurring, poisonous greenish-yellow gaseous non-metallic element used for purifying water, bleaching and in the manufacturing of many **organic** chemicals. It occurs naturally only as a salt, as in sea water.

CONGENER

The individually distinct chemicals that belong to a family of chemicals with similar basic structure, such as **PCBs** and **dioxins**, are know as congeners. PCBs are a mixture of different PCB congeners.

CONTAMINANTS

A contaminant is a substance that is found in a place where it should not be. This does not necessarily mean that it is harmful, but depending on what it is and the amount that is present, it may be. The types of contaminants that are found in the Canadian North include:

1. **Persistent Organic Pollutants (POPs)**, a group of mostly human-made chemicals which include **organochlorines (OCs)** and can stay in the environment for many years without changing. POPs can be transported long distances in the atmosphere and ocean.
2. **Heavy metals** such as **mercury**, **cadmium**, and **lead**; and
3. **Radionuclides** such as cesium, **strontium**, and polonium.

COPPER

Copper is a reddish metal found naturally in some soils and rocks. It is a very good conductor of heat and electricity, and is often used to make electrical wires.

DDE

DDE is a **POP** found in the environment as a result of the breakdown of **DDT**, an insecticide.

DDT

DDT is a **POP** developed in the 1940s to kill lice and to kill biting insects that carry diseases such as malaria, yellow fever, and typhus. DDT was heavily used to kill insects feeding on crops in the 1950s and 1960s in the Great Lakes region until it was found to be harmful to other forms of life. DDT is banned in Canada.

DEOXYRIBONUCLEIC ACID (DNA)

DNA contains all the genetic information of a species. This information can be used to reproduce other organisms of the same species and is passed on from generation to generation through the offspring.

DEMETHYLATION

Demethylation is the **enzymic** removal of a methyl group. Methyl groups are the most basic molecular structures in **organic** chemistry.

DIOXINS/FURANS

Dioxins and furans are highly **toxic** chemical substances. In small doses, these substances do not appear to be a threat. However, large doses of dioxins and furans are known to cause serious health problems, including **cancer**, in laboratory animals. The biggest source of dioxins and furans in Canada is the large-scale burning of municipal and medical waste.

DISEASE RESISTANCE

Disease resistance refers to the ability of animals and plants to withstand the attack from a disease.

ECOSYSTEM
An ecosystem is a system that is formed by the interactions of organisms with their non-living environment. The organisms and the environment work together as a unit, called an ecological unit.

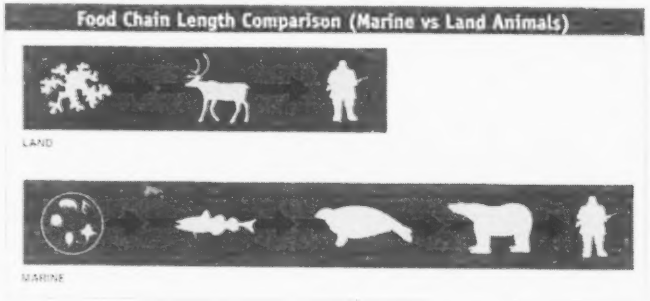
ENDOCRINE-DISRUPTING EFFECTS
The endocrine system primarily controls metabolic activities through hormones. Endocrine glands secrete hormones into the blood, which carries these chemical messages to the target cells. Endocrine-disrupting chemicals interfere with this process by mimicking hormones and/or blocking the target sites.

ENDOSULFAN
Endosulfan is a **POP** generally used as an insecticide in the control of crop insects and mites.

ENZYME
A biological compound that helps the body to process chemicals. Some enzymes are responsible for digesting protein in food. Other enzymes found in the liver are responsible for getting rid of **contaminants**.

FALLOUT
Fallout describes how particles that are held in the air descend to the ground and accumulate on surfaces. Fallout is generally associated with particles that have been sent into the atmosphere following a nuclear explosion or a volcanic eruption and slowly descend, falling onto ground or water surfaces.

FOOD CHAIN
Plants and animals can be linked together in feeding relationships called food chains. At the bottom of food chains are green plants that convert sunlight into food energy for the rest of the chain. Animals that eat the plants are then eaten by another animal, and so on up the chain. The number of animals involved can vary. For example, in the North, the lichen—> caribou—> human food chain has fewer feeding links, and is much shorter than the algae (a small plant that lives in water but needs sunlight)—> fish—>seal—>polar bear—>human food chain. In nature, food chains overlap to form **food webs**.



FOOD CONSUMPTION ADVISORIES
Food consumption advisories are sometimes issued by the Territorial health department in consultation with Health Canada when they determine that the levels of **contaminants** in traditional/country food may risk the health of those who eat this food. Such an advisory may recommend, for example, that people should only eat a certain number of livers from a particular fish species in a year.

FOOD WEB
A food web is the interaction of **food chains**. Food chains, which involve a direction from lower to higher ordered organisms, interact with one another in nature and form webs. These webs are more complex then chains as different organisms cross over into other chains and complicate the flow of energy from one species to another.

GENE EXPRESSION
Pertaining to a gene that is active in nature (not dormant). In order for a gene to become active it must undergo a conversion of the information encoded in a gene first into messenger RNA and then to a protein.

HEAVY METALS

Heavy metals are naturally-occurring metals found in rocks and soils. They are also released to the environment by human activities. They generally do not decay into other elements and therefore persist in the environment. Examples of heavy metals are **mercury** and **cadmium**.

HEXABROMOCYCLODODECANE (HBCD)

Hexabromocyclododecane is a **POP** used for thermal insulation foams, in building and construction in order to meet required high fire safety standards. HBCD is also applied in the backcoating of textiles, mainly for upholstery furniture. It is known to be **persistent**, **bioaccumulative**, **toxic**, and can be transported great distances.

HEXACHLOROCYCLOHEXANE (HCH)

Hexachlorochyclohexane (HCH) is a **POP** used to kill insects, an insecticide. It does not break down easily in the environment, and can be transported great distances in the atmosphere.

IMMUNE SYSTEM

The immune system is made up of cells and tissues responsible for recognizing and attacking foreign microbes and substances in the body.

IMMUNOLOGICAL

Related to the study of the **immune system**.

IMMUNOTOXIC

Something, e.g. bacteria or chemical, that causes damage to the immune system is immunotoxic.

INORGANIC

Inorganic material is inanimate (e.g. non-living) in nature and makes up the **abiotic** environment.

IN UTERO

in utero is a Latin based term that means within the womb

IN VIVO

in vivo is a Latin based term that means in life. It is usually used to describe bodily functions or reactions within a living organism.

ISOTOPE

Isotopes are species of atoms of the same element with nearly identical chemical behaviour but with different mass and physical properties. For example, different isotopes of carbon and nitrogen can be found in nature.

ISOMER

Isomers are different forms of the same chemical compound, being made up of the same number and composition of atoms, but in different arrangements. Each isomer can have a slightly different properties.

LEAD

Lead is a soft, blue-grey, easily-worked **heavy metal** that is naturally present in rocks and soils. It is used to make some kinds of glass, shot for shotguns, and combined with other metals for use in a variety of metallic items. Lead may be released to the environment by human activities, including the use of leaded-gasoline (in North America, lead was added to gasoline until the 1980s). Lead can be **toxic** to living things. In animals and people, lead accumulates in the brain and bones.

LIPOPHILIC

Attracted to fatty tissues.

LONG-RANGE TRANSPORT

Long-range transport refers to the movement of **contaminants** through the atmosphere or the ocean from distant sources. Many

contaminants that are detected in the Arctic have been used in places rather far away but travel through the air and ocean currents eventually reaching the Arctic where they are deposited.

MERCURY

HG Mercury is a **heavy metal** that is naturally found in rocks and soil in combination with other chemicals. It is the only metal that is liquid at room temperature. It is silvery in colour and flows easily so it is sometimes used in thermometers. There are many human-made sources of mercury that are released to the atmosphere. Also, mercury may be released when soils are flooded in the creation of reservoirs for making electricity (hydroelectric dams). Mercury is **toxic** to most living things. It accumulates in the liver, kidneys, hair, and skin of animals and people.

METHYLMERCURY

Mercury, like other metals, can be found in different chemical forms in the environment. Methylmercury is the mainly **organic** form of mercury that is the most **toxic** and likely to cause effects. Methylmercury can also **bioaccumulate** and **biomagnify** in **food webs**.

METABOLISM

The sum of physical and chemical processes occurring within a living cell or organism that are necessary for the maintenance of life. Under these processes, substances are broken down to provide energy for certain vital processes while other substances, necessary for life, are created.

METABOLITE

A substance essential to the **metabolism** of a particular organism or to a particular metabolic process.

NEUROBEHAVIOURAL

Neurobehavioural effects are the way the brain affects emotion, behaviour, and learning via the nervous system.

NEURODEVELOPMENT

Neurodevelopment is the development of the nervous system.

NEUROMOTOR

Neuromotor is the nerve fibre or impulse going away from the central nervous system towards an effector (the ending of a nerve).

NEUROTOXIC

Neurotoxic effects are caused by substances that are considered to be **toxic** to living organisms. These substances can cause irreversible damage to the central nervous system.

NEUTRALS

A compound that is neither acidic nor basic and does not ionize in solution.

NORTHERN CONTAMINANTS PROGRAM (NCP)

The Northern Contaminants Program (NCP) has been developed through consultation with the scientific community, northern Aboriginal organizations, other governmental departments, and northern communities. Its goal is to reduce and wherever possible eliminate **contaminants** in traditional/country food. This goal is supported by involving northerners in the program, and by providing them with the tools and information for making their own informed decisions on food consumption.

NUNAVIMMIUT

Nunavimmiut are Inuit residents of Nunavik.

NUNAVUMMIUT

Nunavummiut are Inuit residents of Nunavut.

OOCYTES
A cell that gives rise to an ovum (female egg cell) by meiosis (cell division).

ORGANIC
Organic material is derived from living organisms and is made up of carbon-based compounds.

ORGANOBROMINE
Organobromines are bromine-containing chemicals made by humans. Several organobromines are used as flame retardants in plastics.

ORGANOCHLORINES (OC)
Organochlorines (OCs) are **chlorine**-containing chemicals made by humans. Organochlorines dissolve in fats and oils, and therefore are stored in the fat and blubber of animals (i.e. **bioaccumulate**) and are passed on through the **food chain** (i.e. **biomagnify**). Examples of OCs include: **toxaphene**, and **chlordane**. Organochlorines can be **toxic** or poisonous to living things.

OXIDATIVE STRESS
Oxidative stress is a condition where increased oxidant production in organisms is characterized by the release of very unstable and highly reactive molecules results in cellular degeneration.

PBDEs/BDPEs
Polybrominated diphenyl ethers and brominated diphenyl ethers are a group of human-made **organobromine** chemicals that are used as flame retardants in various plastic materials, such as polystyrene. (See also **polybrominated biphenyls (PBBs)**).

PCBs
Polychlorinated biphenyls (PCBs) are a group of human made, industrial **POP** chemicals. There are many different kinds of PCBs. Because they do not conduct electricity, PCBs were used in electrical transformers as insulators since the 1930s. PCBs do not break down easily in the environment and there is concern that they may be harmful to living things. Some kinds of PCBs are thought to cause **cancer** and may contribute to other subtle effects in unborn children. The use of PCBs was banned in many countries, including Canada, in the 1970s.

PATHOLOGY
The study of the essential nature of diseases and especially of the structural and functional changes produced by them.

PERFLUORINATED ACIDS (PFAs)
Perfluorinated acids (PFAs) have no known route of degradation or metabolism under normal environmental conditions, meaning that they are extremely persistent in the environment. Examples of PFAs are **perfluorooctane sulfonate (PFOS)** and **perfluorooctanoic acid (PFOA)**.

PERFLUOROOCTANE SULFONATE (PFOS)
Perfluorooctane sulfonate is an example of a **perfluorinated acid (PFA)** that has recently been identified in liver and blood of polar bears and seals in the Arctic, including some samples from Nunavut. There is a lot of concern about the presence of this chemical in the environment as PFAs are highly **persistent** and not known to degrade. They can cause **cancer**, lead to enlarged livers as well as affect the fertility of wildlife.

PERFLUOROOCTANOIC ACID (PFOA)
Perfluorooctanoic acid (PFOA), similar to **perfluorooctane sulfonate (PFOS)** is a **perfluorinated acid (PFA)** that has recently been identified in liver and blood of polar bears and seals in the Arctic, including some samples from Nunavut. There is a lot of concern about the presence of this chemical in the environment as PFAs are highly **persistent** and not known to degrade. They can cause **cancer**, lead to enlarged livers as well as affect the fertility of wildlife.

PERSISTENT
Persistent, when referring to chemicals, is the resistance of a chemical to break down. A persistent chemical, once introduced, stays in the environment for an indefinite length of time.

PERSISTENT ORGANIC POLLUTANTS (POPs)

Persistent organic pollutants (POPs) are a group of human-made chemicals used as **pesticides** and industrial chemicals, which includes the substances called **organochlorines (OCs)**. POPs can be transported long distances in the atmosphere and can stay in the environment for many years without changing.

PESTICIDES
Pesticides are poisons used to kill pests (plants or animals that are a nuisance or harmful). There are two main types: insecticides used to kill insects, and herbicides used to kill weeds, mold, and fungus. **Chlordane**, **toxaphene**, **HCH**, and **DDT** are examples of pesticides.

POLYBROMINATED BIPHENYLS (PBBs)
Polybrominated biphenyls are a group of human-made **organobromine** chemicals that are used as flame retardants in various plastic materials, such as polystyrene. (See also **PBDEs/BDPEs**)

POLYCHLORINATED N-ALKANES (PCAs)
Polychlorinated n-alkanes are a group of **toxic** chemicals belonging to the polychlorinated aromatic compounds **(PCAs)**. Their most common applications include use as high temperature lubricants in metal-working machinery.

POLYCHLORINATED NAPTHALENES (PCNs)
These chemicals are a group of 75 compounds which have been used as lubricants, fungicides, insecticides, and as insulators which pre-date **PCBs**. They are similar in structure to PCBs, and are **toxic**.

POLYPEPTIDE
A chain of amino acids linked by a chemical bond formed between neighbouring amino acids. Many polypeptide chains combined to form a protein.

QUALITY ASSURANCE/QUALITY CONTROL
QA/ QC
Because research is conducted by many different people in many regions across the country, it is often difficult to ensure that the same standards in producing data are in use. Quality assurance/quality control is a system of procedures and corrective actions that attempt to ensure that the different research studies, environmental monitoring and sampling, and other technical and laboratory activities are comparable with another and the data reported are of the highest quality possible.

RADIONUCLIDES

Radionuclides are atoms that emit radiation and, like **heavy metals**, are naturally present in rocks and soils. They may also be human-made. Certain kinds of radionuclides have been released to the environment through atmospheric testing of nuclear weapons, nuclear waste dumping and uranium mining. Radionuclides tend to accumulate in the bones and muscles of animals and people. Natural radionuclides in the Canadian North include polonium and **lead**.

RISK ASSESSMENT
The qualitative and quantitative study of the risk posed to human health and the environment by the presence and/or use of specific pollutants.

SELENIUM
Selenium is a nonmetallic element that resembles sulfur. It can be naturally found in rock and soils from some areas and it has been suggested that at the right concentration, it can counteract the effects of **mercury**, but this is unproven as of yet.

SERUM
The fluid part of blood called is plasma. Serum is this fluid minus the fibrogen (blood clotting property).

SPATIAL PATTERNS
Variations over a given geographic area.

STOCKHOLM CONVENTION
The Stockholm Convention is a global treaty to protect human health and the environment from **persistent organic pollutants (POPs)**.

STRONTIUM
A naturally occurring radioactive element which is used to date rock and sediments.

TEMPORAL TRENDS
Changes over time.

TOXAPHENE
Toxaphene is a **POP** chemical that was used as a **pesticide** from the 1950s to 1970s. It is very poisonous to living things, especially fish. Toxaphene has never been licensed for use in Canada, and it was banned in the United States in 1982.

TOXIC (TOXICITY)
Toxic (toxicity) refers to the capability of a substance to cause harm or be poisonous to humans, animals, or other living things. In common usage, the term toxic substances refers to chemical substances that are capable of causing harm at very low levels of exposure.

TOXICOLOGY
Toxicology refers to the scientific study of the effects, chemistry, and treatment of poisonous (toxic) substances.

TROPHIC LEVELS
Levels in a **food web** characterized by organisms which are the same number of steps removed from the primary producers of **ecosystems** (e.g., generally aquatic and terrestrial green plants comprise the first ropic level, and plant-eating organisms comprise the second.)

VAPOUR
A substance in the gaseous state, as distinguished from a liquid or solid state.

ZINC
Zinc is a brittle metal at ordinary temperatures, and is not found abundantly in nature. It is used in the preparation of certain metal alloys, like bronze and brass. An excess of zinc can be **toxic**.

ZOOPLANKTON
The passively floating or weakly swimming usually microscopic animal life in a body of water.

Affiliation and Project Leaders

The following list can be used to search for a project by affiliation or project leader.

Akaitcho Territory Government
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Key Subject Areas and Contaminants

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CHLORDANE
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CHLORINATED PARAFFINS
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For More Information

If you wish to obtain more information on any of the projects within this booklet or have any questions regarding contaminants in general, please feel free to contact any of the persons listed below; they will be glad to assist you.

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